SOIL SURVEY OF PRINCE EDWARD COUNTY

BY

N. R. RICHARDS

EXPERIMENTAL FARMS SERVICE

AND

F. F. MORWICK

ONTARIO AGRICULTURAL COLLEGE

GUELPH, ONTARIO

NOVEMBER 1948

REPORT No. 10 OF THE ONTARIO SOIL SURVEY

Ontario Ministry of Agriculture and Food

David Ramsay, Minister

Agriculture Canada

Research Branch

Direction générale de la recherche

SOIL SURVEY OF PRINCE EDWARD COUNTY

BY

N. R. RICHARDS

EXPERIMENTAL FARMS SERVICE

AND

F. F. MORWICK

ONTARIO AGRICULTURAL COLLEGE

GUELPH, ONTARIO

NOVEMBER 1948

Reprinted January 1990

REPORT No. 10 OF THE ONTARIO SOIL SURVEY

Ontario

Ministry of Agriculture and Food

David Ramsay, Minister

Agriculture Canada

Research Branch

Direction générale de la recherche

90-05758/1

For other Counties and
Districts Survey Information,
Contact the
Consumer Information Centre,
Ontario Ministry of Agriculture and Food,
Main Floor,
801 Bay St.,
Toronto, Ontario
M7A 2B2

ACKNOWLEDGMENTS

The Dominion Department of Mines and Resources, Surveys and Engineering Branch, Hydrographic and Map Service supplied the base maps. The final copy of the Soil Map for lithographing was prepared by the cartographic section of the Field Husbandry Division, Central Experimental Farm, Ottawa.

Helpful suggestions pertaining to classification and correlation and assistance in critically reviewing the manuscript came from Professor G. N. Ruhnke, Ontario Agricultural College, Dr. P. O. Ripley, Dr. A. Leahey, Mr. P. C. Stobbe, Dominion Department of Agriculture and others.

The Agricultural Representative of the Provincial Department of Agriculture at Picton provided office space for the survey party.

PREFACE

The soils of Prince Edward County were surveyed during the summer of 1943.

Other Counties and Districts surveyed and maps published are as follows:

1.	*Norfolk*	*Map only*
2.	*Elgin*	*Map only*
3.	*Kent*	*Map only*
4.	*Haldimand*	*Map only*
5.	*Welland*	*Map only*
6.	*Middlesex*	*Map only*
7.	*Carleton*	*Map and Report*
8.	*Parts of Northwestern Ontario*	*Map and Report*
9.	*Durham*	*Map and Report*
	Soil erosion and Land Use Survey Hope Township Project Area	*Map and Report*

In addition to the above the following Counties have been surveyed.

Essex	*Peel*
Oxford	*Dufferin*
Wentworth	*Northumberland*
Halton	*Grenville*
York	*Perth*
Peterborough	*Huron*
Brant	*Simcoe*
Waterloo	*Wellington*
Lincoln	*Dundas*

TABLE OF CONTENTS

		Page
Part I.	General Description of Area	9
	Location and Area	9
	County Seat and Principal Towns	10
	Transportation and Markets	10
	Population and Racial Origin	12
Part II.	Factors Affecting Formation of Soils in the Area	
	Soil Materials	14
	Relief	16
	Drainage	17
	Climate	18
	Natural Forest Vegetation	22
	Age	23
Part III.	The Classification and Description of Prince Edward County soils	25
	System of Classification	27
	Differentiation According to Soil Materials and Drainage	27
	Darlington Loam	29
	Waupoos Clay	31
	Solmesville Clay Loam	33
	South Bay Clay	34
	South Bay Clay Loam	35
	Elmbrook Clay	37
	Elmbrook Clay Loam	39
	Pontypool Sandy Loam	41
	Pontypool Sand	43
	Brighton Sandy Loam	44
	Brighton Gravelly Sand	46
	Percy Fine Sandy Loam	47
	Tecumseth Sandy Loam	49
	Granby Sandy Loam	50

TABLE OF CONTENTS (*Cont'd*)

PAGE

Part III. THE CLASSIFICATION AND DESCRIPTION OF PRINCE EDWARD COUNTY SOILS—(*Continued*)

FARMINGTON Loam 52
FARMINGTON Loam—imperfectly drained 54
AMELIASBURG Clay Loam 55
AMELIASBURG Clay Loam—imperfectly drained 56
AMELIASBURG Loam 57
ATHOL Sandy Loam 57
HILLIER Clay Loam 58
GEROW Clay Loam 61
EASTPORT Sand 62
MARSH 62
MUCK 64
BOTTOM LAND 65
ROCK 66

Part IV. AGRICULTURE AND LAND USE

Early Settlement and Agricultural Development 67
Present Agriculture and Land Use 68
Crop Adaptability Ratings and Land Use Management 72
GROUP I—Good Crop Land 72
GROUP II—Good to Fair Crop Land 73
GROUP III—Fair Crop Land 74
GROUP IV—Fair to Poor Crop Land 75
SUBMARGINAL CROP LAND 76

Part V. ANALYTICAL DATA 78

APPENDIX 82

MAP—Soil Map of Prince Edward County ..... in pocket back of report.

TABLES

No.		Page
1.	Population of Prince Edward County	12
2.	Mean Monthly Temperature for Bloomfield and Other Selected Points in Ontario	19
3.	Mean Monthly Precipitation in Inches for Bloomfield and Other Selected Points in Ontario	19
4.	Mean Monthly Precipitation for June, July and August	20
5.	Utilization of Land in Prince Edward County	70
6.	Occupied Land According to Township	70
7.	Acreage of Crops According to Township	71
8.	Crop Adaptability Ratings for Good Crop Land	73
9.	Crop Adaptability Ratings for Good to Fair Crop Land	74
10.	Crop Adaptability Ratings for Fair Crop Land	75
11.	Crop Adaptability Ratings for Fair to Poor Crop Land	76
12.	Crop Adaptability Ratings for Submarginal Crop Land	77
13.	Comparative Levels of Readily Available Phosphorus in Heavy Textured Soils of Prince Edward, Carleton, Peel, Haldimand, Huron and Middlesex Counties	78
14.	Chemical and Physical Composition of Samples of Surface Soil from Prince Edward County	82
15.	Base Exchange Capacity and Per Cent Saturation of Surface Soil Samples from Prince Edward County	85

ILLUSTRATIONS

Figure		Page
1.	Outline map of Ontario showing the location of Prince Edward County and other areas for which soil maps have been published	8
2.	Outline map of Prince Edward County showing townships, towns, railways etc.	11
3.	Outline map of Prince Edward County showing distribution of Soil Materials	16
4.	Outline map of Prince Edward County showing Drainage Classes	17
5.	Diagram showing Mean Monthly Temperature and Precipitation for Bloomfield	21
6.	Outline map of Prince Edward County showing Forest Associations	23
7.	Comparative Levels of Available Phosphorus in Heavy Textured Surface Soils	79

FIG. 1—Outline map of Ontario showing the location of Prince Edward County and other areas for which soil maps have been published.

Soil Survey of Prince Edward County, Ontario

by

N. R. Richards and F. F. Morwick*

PART I

GENERAL DESCRIPTION OF THE AREA

Location and Area

Jutting into the waters of Lake Ontario, Prince Edward County is almost completely separated from the mainland by the Bay of Quinte. Originally connected with the mainland at Carrying Place, the County has been made into an "island" by the cutting of the Murray Canal, five miles in length and deep enough to allow for passage of large boats. A bridge, which spans the Bay of Quinte, connects the County with the mainland and the County of Hastings to the north at the city of Belleville. Physiographically Prince Edward County is a broad flat limestone plateau, most of it having an altitude of about 400 feet above sea level. It has been estimated to have about 500 miles of shore line and no part of it is far removed from the water.

*Mr. C. A. Nichol and Professor L. A. Birk assisted with the field work; the analytical work was done by Messrs. A. L. Willis and H. S. Ive; Miss G. V. Palmer assisted with the drawing of charts, maps, etc.

Prince Edward County, with an alleged 500 miles of shore line, offers excellent opportunity for summer resort development.

The total land area of Prince Edward County, according to the 1941 Census of the Dominion of Canada, is 249,600 acres of which 94.5% is listed as occupied land.

County Seat and Principal Towns

Picton, located at the head of the Bay of Quinte, enjoys magnificent scenery on all sides and is the largest town in Prince Edward County. Being one of the oldest towns in the Province, it has enjoyed an interesting and varied history and from the earliest days of settlement has served as an important marketing and community centre. As well as serving the agricultural communities, it also plays host to many tourists who come to Prince Edward County, Quinte's Isle of Lakes and Bays, seeking rest and recreation.

Lake freighters call at Picton harbour with cargoes of coal and other commodities and to load agricultural goods produced in the County. The County offices and the office of the representative of the Provincial Department of Agriculture are located in Picton. Two newspapers are published, the Picton Times and the Picton Gazette, the latter enjoying the distinction of having been published for over one hundred years.

The canning of peas, tomatoes, corn and other farm products is the main industry found in the town. The Prince Edward County Fruit Growers' Co-operative has a modern plant used for the cold storage of dairy, poultry and fruit products. Other industries include a creamery, dairy and glove factory.

Bloomfield, incorporated as a village in 1906, is situated 5 miles west of Picton. Located in the heart of a flourishing agricultural district, it serves the needs of a large rural area. Canning factories, grist mills, a sawmill and a creamery are its chief industries.

The village of Wellington, picturesquely located on Wellington Bay, is ideally situated for tourist trade. It was incorporated as a village in 1862. The canning industry and processing of milk products are its chief industries.

Transportation and Markets

Transportation in Prince Edward County for many years depended upon the waterways and all shipping and travel was done by boats. During the time of the barley and hop trade, many local men owned their own boats and used them in transportation of their products to New York State. Steam power gradually took the place of the slower and less commodious sailing vessels. In the early days when the waterways were the only means of transportation, the County enjoyed an enviable reputation for boat building and there were a number of dry-docks where boats were constructed. Records show that shipyards were located near Point Traverse, South Bay, and at Black Creek, Picton, Rednersville and Wellington.

The first train to arrive in Picton was in the year 1879 over the C.N.R. Trenton to Picton line. In the early days of the County the railway served a very useful purpose. However, with the building of improved roads, most of the freight for the County is hauled by truck. The C.N.R. maintains an automotive express trucking service from Picton to its main lines at the present time.

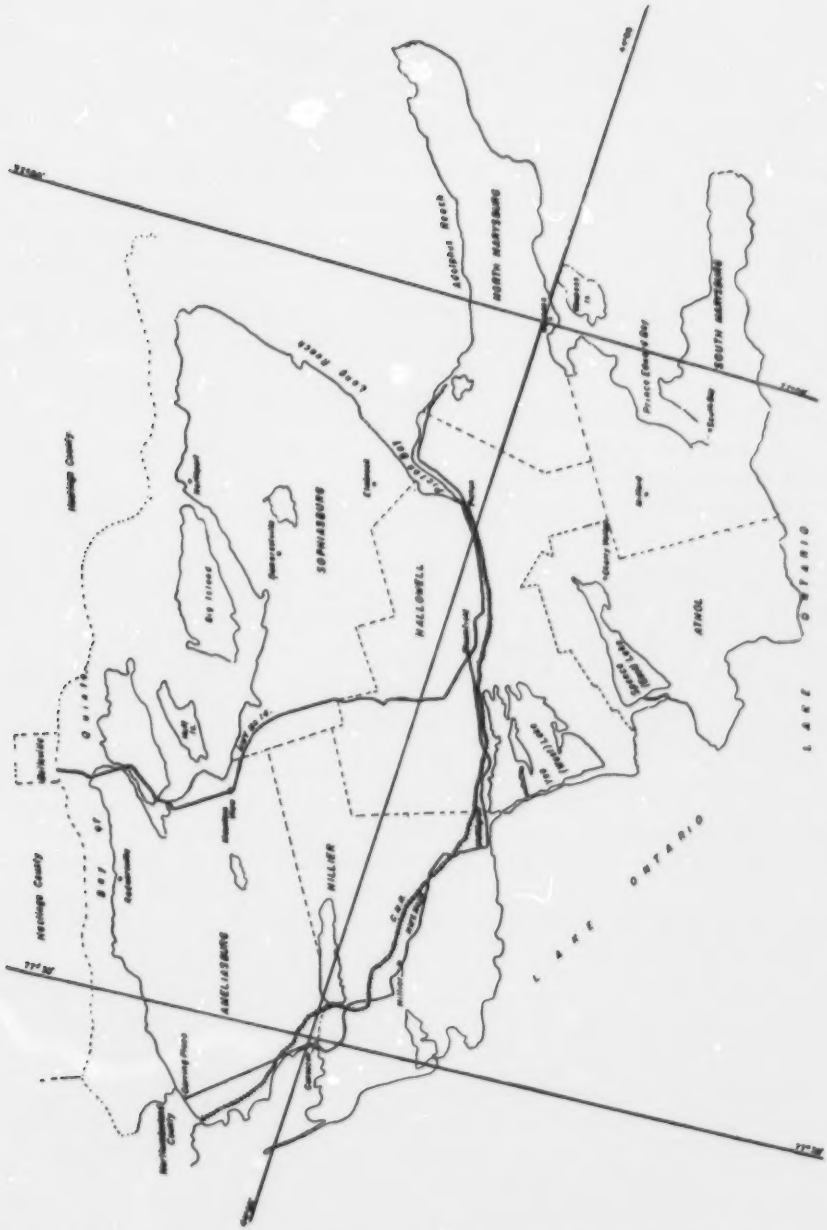


FIG. 2—Map of Prince Edward County showing townships and principal centres.

Prince Edward County is served by an excellent system of Highways. A glance at figure (2) shows that all the main roads lead out from Picton, the County town. Highway No. 14 joins the County with the much travelled Highway No. 2 and the mainland at Belleville. The new scenic Highway No. 33, from Kingston to Trenton, passes through the heart of the County, including Picton and Wellington, following a beautiful drive along the shores of Lake Ontario. At the Adolphustown-Glenora crossing a free ferry provides transportation across Adolphus Reach. In addition to the above-mentioned main arteries, an excellent system of township roads is maintained connecting Picton, the hub of the County, with the surrounding rural areas.

The County town of Picton, and the city of Belleville in the County of Hastings are the chief marketing centres serving the agricultural area of Prince Edward County. However, a large proportion of the agricultural produce, particularly apples, canning crops and cheese, is marketed in Toronto and Montreal and some exported.

Population and Racial Origin

The total population of Prince Edward County, according to the 1941 Census was 16,750. Of the 11,166 rural inhabitants about 70% were on farms. The following figures indicate the trend of population in the area since 1871.

TABLE 1

POPULATION OF PRINCE EDWARD COUNTY

Year	Population
1871	20,366
1881	21,044
1891	18,889
1901	17,864
1911	17,150
1921	16,806
1931	16,693
1941	16,750

The figures indicate that from 1881 to 1931 the population decreased. There has been little fluctuation in total population for the last thirty years.

The rural population predominates in the county. However, there has been a slight increase in the urban numbers in the last 20 years as indicated by the following figures.

Year	Total	Urban	Rural
1921	16,806	4,780	12,026
1931	16,693	5,227	11,466
1941	16,750	5,584	11,166

According to the 1941 Census, the British Isles Races (English, Irish and Scottish) are the principal racial origin of the people in the area. The population classified according to principal origin is shown in the following table:

Total population of county		16,750
British—English		9,892
	Irish	2,678
	Scottish	1,604
	Others	141
		14,315 (85.5%)

The remaining 14.5 per cent includes the following in descending order of numbers, Netherlands, French, German, Indians, Scandinavian, Italian, Jewish, Chinese, and others

The distribution of the population of Prince Edward County is indicated by the following figures:

Township	Population
Ameliasburg	2,472
Athol	1,066
Hallowell	2,684
Hillier	1,420
Marysburg N.	1,027
Marysburg S.	907
Sophiasburg	1,500
Incorporated Urban Centres	
Picton	3,901
Bloomfield	647
Wellington	1,036
Total for County	16,750

PART II

FACTORS AFFECTING THE FORMATION OF SOILS IN THE AREA

Soils are natural bodies found at the surface of the earth in which plants grow and are the products of the environmental conditions under which they have developed. The processes that are involved in soil development are controlled by a number of factors which include soil materials, relief, vegetation and other living organisms, climate, and age. The effect of these factors on soil development may be modified by man's influence.

Soil Materials

The development of the soil may be greatly affected by the nature of the soil materials from which it is formed. Disintegrated rock particles form the soil skeleton within which the active clay and humus colloids are formed. The chemical and physical composition of the parent material has a marked influence on profile development. The movement of the soil water within the profile affects the amount of leaching to which the soil is subjected.

Except for a small hill of Pre-Cambrian granite 5 miles south of Belleville, in Ameliasburg Township, the upper bedrock in Prince Edward County is fine to medium-grained brownish grey calcium limestone of the Trenton formation. The limestone is in thin beds, seamed and interbedded with calcareous shale and has a prevailing dip to the south. Exposures are frequent both along the lake shore and inland. Near Picton, cliffs 200 feet high exhibit the thinly bedded rubbly characteristics of the limestone commonly found in the County. These rubbly beds are also well exposed in numerous outcrops and small quarries over the northern and eastern parts of the county.* The limestone is only fairly pure being seamed and interbedded with the shale partings. It is low in content of magnesium carbonate. The Trenton limestones of Ontario on analysis, show a rather high percentage of insoluble matter.

*Analyses of Prince Edward County limestones are, herewith, presented and compared with those of dolomitic limestone from Wellington County.

	†Prince Edward County	‡Wellington County
Silica oxide (SiO_2)	4.86	.34
Ferric oxide (Fe_2O_3)	.84	.20
Alumina oxide (Al_2O_3)	1.44	.12
Tri-calcium phosphate ($Ca_3(PO_4)_2$)	.17	0.07
Calcium carbonate ($CaCO_3$)	90.91	54.39
Magnesium carbonate ($MgCO_3$)	1.20	44.31
Total	99.42	99.43

†Location of quarry Lot 1, Gore B., Sophiasburg Township.

‡Quarry of Gypsum, Lime and Alabastine, Canada, Ltd.; Puslinch Township

The above figures indicate the marked difference in calcium carbonate and tri-calcium phosphate content of the limestones in the two areas. This

*Limestones of Canada, Their Occurrence and Characteristics—by M. F. Goudge, Canada Department of Mines and Resources.

*Goudge, M. F. Limestones of Canada Their Occurrence and Characteristics Part IV Ontario, Canada Department of Mines and Resources; Bureau of Mines No. 781.

greater content of tri-calcium phosphate in the underlying bedrock is quite possibly reflected in the higher phosphorus content of the soils of Prince Edward County as compared with those of south western Ontario.

In the southwestern section of the County, particularly in Hillier and part of Hallowell Townships, the shale partings are more frequent than in the bedrock of the rest of the area. Frequent limestone rubbles and heavy texture characterize the soils developed from this shaley limestone.

The last continental ice sheet retreated in a northeasterly direction and for the most part left a deposit of till of varying depths over the Trenton limestone bedrock. The materials deposited by the glacier during its retreat are derived chiefly from local sources and have been transported for only relatively short distances. Most of the materials contained in the till soils of Prince Edward County are derived from Trenton limestone. In general the materials deposited in the glacial debris are fairly uniform. The till was deposited either as a thin veneer over the underlying bedrock or in elongated ridges.

Good agricultural soils, characterized by rolling topography, good drainage and frequent stones throughout the soil profile, are developed on the till materials. Frequently the stony till soils occur in association with comparatively level clay plains.

Large areas within the County are covered by water laid materials. During the time of glaciation Prince Edward County was depressed below sea level. As the ice receded the water followed in its wake to cover the lowland areas of the St. Lawrence valley. According to †Fairchild this body of the ocean, referred to as Gilbert Gulf, extended to cover areas in the Bay of Quinte district. It was during this period that the sedimentary clays of Prince Edward County were deposited.

As the ice continued to recede, and the area was relieved of the tremendous pressure, the land gradually rose to its present level causing a general recession of the waters of Gilbert Gulf. Finally the waters entrenched themselves in their present channels, the Bay of Quinte and St. Lawrence River.

The sedimentary materials of Prince Edward County contain a high proportion of particles less than .002 millimetres in diameter, are stonefree and calcareous. They are less alkaline than the till and often occur in close association with it as a shallow deposit, one and a half to three feet in depth.

In the vicinity of Picton a narrow belt of kame and esker material begins and runs as an uneven series of ridges and hills almost to West Lake. These materials were deposited by a stream flowing through the ice at the time when the area was covered by a glacier. The ridge varies in elevation from 450 feet at the cemetery in the town of Picton to 300 feet at its southwest end. A large gravel pit is located in the kame in the town of Picton. Its crest is followed by the "ridge road" and at various points along its course, sand and gravel are quarried. This fluvio-glacial deposit forms the most important source of sand and gravel in the County.

†Fairchild: Gilbert Gulf (Marine Waters in Ontario Basin) Bull. Geol. Soc. Am. Vol. 17, 712-718, 1905.

Fairly extensive areas of outwash soil materials are located in the Picton-West Lake area in association with the Picton esker and also in the Black River and Milford districts. These materials are characterized by level to slightly undulating topography and a layering or stratification of the finer and coarser sandy and gravelly materials.

Fig. (3) illustrates the distribution of soil materials in the surveyed area.

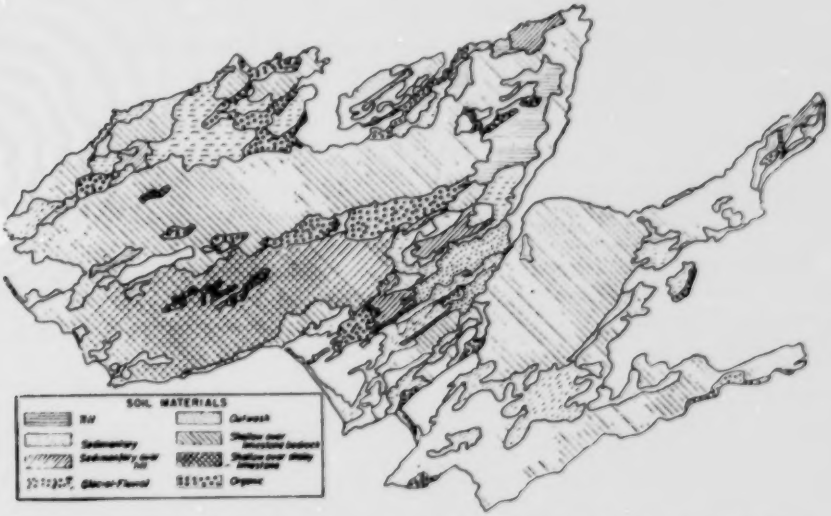


FIG. 3—Map showing the distribution of soil materials in Prince Edward County.

Relief

The outstanding feature of the topography of Prince Edward County is the broad level limestone tablelands broken by steep rugged escarpments. In the west end of the County, at Carrying Place, the topography is level but at Onderdonk, a distance of approximately 3 miles, a hill of limestone rises 100 feet above the bay. A couple of miles northeast, near Rednersville, a large island-like tableland reaches 400 feet above sea level (154 feet above the bay) and presents a bold escarpment toward the Bay of Quinte. Near Victoria Church another escarpment rises toward the south and runs east past Ameliasburg, Mountain View, and Crofton to Demorestville, a distance of 15 miles with an elevation of 100 feet in most places. In front of the escarpment and bordering the Bay of Quinte, level plains covered with heavy sedimentary soil materials are common.

South of the long escarpment, described in the foregoing paragraph, in the central part of the county the land is high and forms a tableland covered by till deposits of varying depths occasionally pushed into ridges from northeast to southwest. This limestone plain is crossed in places by escarpments, which are due to the more resistant layers of underlying limestone, and culminates east of Picton in a broad upper tableland at 450 and 500 feet above sea level. In the immediate vicinity of Picton the topography is rolling and

the Picton esker, with an altitude of 450 feet in the cemetery at Picton, declines to 300 feet at its southwest end. Two large swamps are contained within the county, one at Fish Lake, and the other extending with few interruptions for 14 miles through the central section of the county.

Low shores extend from Huyck Point to the village of Wellington where an immense sand bar, nearly 5 miles long, separates West Lake from Lake Ontario. West Lake has a triangular shape with narrow ridges of till projecting southwest into it. East Lake, a couple of miles to the southeast has been formed by a shorter sand bar. In the Cherry Valley district the topography is rolling with level plains along the north side of East Lake. In the eastern section of the county the topography is fairly level with steep cliffs along the shorelines.

This highest tableland in the county reaches an altitude of 500 feet above sea level. Parts of the rugged shore of Prince Edward County rise above the Bay of Quinte and Lake Ontario as vertical cliffs reaching 170 feet in height at Glenora. The altitude of the County ranges from 246 to about 500 feet.

Drainage

The central section of the County is drained by Pearsall Creek, a small stream winding its way through the Big Swamp, with an outlet in Consecon Lake. The Black River is a fairly large drainage unit in the southeasterly section of the County. For the most part, however, there are no large and extensive drainage systems. Surface drainage is usually facilitated by small streams which find outlets in the numerous lakes and bays. Drainage improvement, in many instances, is difficult because of the proximity of the underlying bedrock.

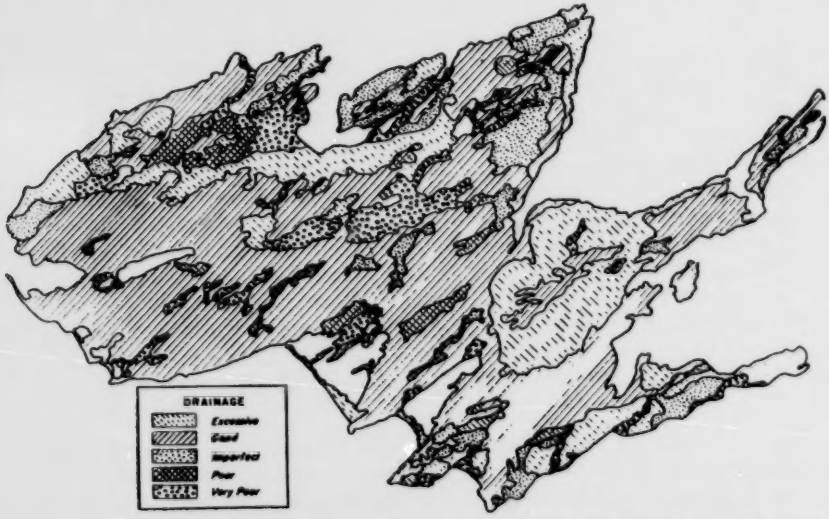


FIG. 4—There are five drainage classes represented in the Prince Edward County area.

Texture, topography and depth of soil mantle over bedrock influence internal drainage. Movement of water within the heavy soils is slow, often resulting in a poor and imperfectly drained condition. The moisture relationship on the shallow soils over bedrock is variable ranging from a water saturated condition in periods of high rainfall to a drought condition during periods of low rainfall. The intermediate textured, strongly undulating to rolling soils have good internal and external drainage. The organic soils are very poorly drained. Five classes were established to express the drainage factor in Prince Edward County and their distribution is shown in Figure (4).

Climate

Climate is one of the major factors governing the development of soils from rock materials. It also determines to a large extent the crops which can be grown in an area.

For a comprehensive discussion on the climate of Ontario the reader is referred to *Putnam and Chapman's paper on "The Climate of Southern Ontario." The climate of southern Ontario is usually stated to be of the modified humid continental type. The location of the region with respect to large bodies of water greatly modifies both the temperature and moisture relationships. The climatic environment of Prince Edward County has favoured the development of soils exhibiting Grey-Brown Podsolic characteristics.

The only meteorological station located within the county is at Bloomfield. Weather data is also recorded at Belleville, in the county of Hastings. Climatic data from other fruit growing areas are presented so that the reader may have an opportunity to compare these with the Prince Edward County area. Morrisburg, located on the St. Lawrence River in Dundas County and Simcoe in Norfolk County are both fruit growing districts.

Since the climate of an area is reflected in the development of the natural vegetation and soils, a comparison of data from the area under consideration will be made with that of stations representing other vegetative zones. Brantford is included to represent the Grey-Brown Podsolic soils and the zone of southern hardwoods common to most of the agricultural areas of Southern Ontario. The data from Guelph is given to afford an opportunity for the reader to correlate the climatic factor with crop yields obtained on the experimental plots at the Ontario Agricultural College. The prevailing forest association in the area, in which Guelph and Bloomfield are located, is broad-leaved with a reduction in the number of species as compared to the Brantford region. In Prince Edward County in addition to the broad-leaved trees the Red Cedar and Juniper are found. Morrisburg and Ottawa are located in an area where the general character of the tree cover is broad-leaved with a fair representation of coniferous growth. Kapuskasing represents the northern coniferous region.

The mean annual temperature of Prince Edward County is 43.9° as compared with 45.3° at Brantford, 41.6° at Ottawa and 32° at Kapuskasing. The extreme low temperature recorded for the area is -33° while 100° is the ex-

*The Climate of Southern Ontario—Putnam, D. F. and Chapman, L. J.—Scientific Agriculture 18:8, April 1938.

TABLE 2

MEAN MONTHLY TEMPERATURE FOR BLOOMFIELD AND OTHER SELECTED POINTS IN ONTARIO

	Period of Record	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Bloomfield	38	19.9	17.6	27.6	40.6	52.8	62.4	68.8	67.0	60.5	48.8	36.8	24.9	43.9
Belleville	47*	18.6	18.8	28.2	42.0	54.2	64.9	70.1	67.8	60.2	47.1	35.1	21.8	44.1
Ottawa	52	11.8	12.7	24.7	41.4	54.9	64.6	68.9	66.3	58.5	46.2	32.4	17.3	41.6
Morrisburg	24	15.6	15.2	26.8	40.0	52.8	62.4	67.2	64.9	62.7	46.6	34.3	19.9	42.4
Peterborough	61	17.3	16.3	27.7	42.4	54.5	63.8	69.0	66.6	59.7	47.6	34.6	21.5	43.4
Orono	15	20.8	19.0	28.7	40.8	52.2	62.8	68.0	66.5	59.2	46.4	35.8	24.0	43.7
Kapuskasing	19	-2	2	14	31	46	57	62	60	51	39	21	6	32
Brantford	62	21.6	19.5	30.5	43.3	55.4	64.9	69.9	67.3	60.7	48.2	36.9	25.7	45.3
Guelph	55	20	19	28	42	53	63	68	66	59	47	36	24	44
Simcoe	23*	23.8	23.5	31.2	43.2	54.6	64.6	69.3	67.3	61.6	49.8	38.4	27.5	46.2

*Broken Period.

TABLE 3

MEAN MONTHLY PRECIPITATION IN INCHES FOR BLOOMFIELD AND OTHER SELECTED POINTS IN ONTARIO

	Period of Record	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Bloomfield	38	2.83	2.27	2.34	2.56	2.48	2.25	2.26	2.21	2.62	2.59	2.76	2.71	29.88
Belleville	47*	3.26	2.46	2.63	2.17	2.37	2.66	2.52	2.65	2.78	2.28	2.85	2.54	31.70
Ottawa	52	2.98	2.40	2.65	2.32	2.74	3.39	3.67	3.00	2.94	2.68	2.63	2.84	34.24
Morrisburg	24	3.69	2.97	3.09	3.28	3.22	3.20	3.12	3.34	2,83	3.42	3.35	3.09	38.60
Peterborough	61	2.19	1.98	2.43	1.74	2.18	2.24	2.32	2.05	2.68	2.19	2.45	2.21	26.66
Orono	15	3.58	2.56	3.01	2.99	2.51	3.02	2.47	2.47	2.83	2.29	3.65	2.84	34.22
Kapuskasing	19	2.00	1.06	1.56	1.82	2.12	2.33	3.43	2.94	3.54	2.50	2.39	1.90	27.59
Brantford	62	2.61	2.12	2.16	2.54	2.90	2.65	3.05	2.93	2.63	3.47	2.40	2.24	30.70
Guelph	55	2.35	1.79	1.88	2.30	2.80	2.89	3.24	2.87	2.67	2.39	2.48	1.99	29.65
Simcoe	23*	3.51	2.64	2.93	3.20	2.51	2.81	2.92	2.59	3.00	2.68	3.31	3.05	35.15

*Broken Period.

treme high. The winter mean temperature (December, January and February) is 20.8° considerably higher than that for Ottawa, Morrisburg or Kapuskasing but lower than Simcoe and Guelph.

The mean spring temperature is approximately 41.0° which is about the same as Ottawa but lower than Simcoe which is 43°F. The mean summer temperature of 66° is comparable to that which prevails in the rest of Southern Ontario. The autumn mean of 48.7° is somewhat higher than Ottawa and similar to that of Guelph, Brantford and Simcoe.

The average length of the frost free period is 143 days which is similar to the Lake Ontario shore region. The average date of the last spring frost is May 15 with the average first frost occurring on October 15. The average growing season begins on April 16 and ends on October 30.

The moisture relationships of the Prince Edward County area are sufficiently different from the other climatic regions of the province for describing it as a separate area. The average annual precipitation is 29.8 inches, which, with the exception of Peterborough, Kapuskasing and Guelph, is the lowest in the province. It is considerably lower than the fruit growing areas of Simcoe and Morrisburg.

Only 14.3 inches of this precipitation or less than half falls between April 1 and October 1. The average rainfall for June, July and August is 6.7 inches, which, with the exception of Peterborough, is the lowest in Southern Ontario.

TABLE 4

MEAN MONTHLY PRECIPITATION FOR JUNE, JULY AND AUGUST

	Period of Record	June	July	August	Total
Bloomfield	38	2.25	2.26	2.21	6.72
Belleville	47*	2.66	2.52	2.65	7.83
Ottawa	52	3.39	3.67	3.00	10.06
Morrisburg	24	3.20	3.12	3.34	9.66
Peterboro	61	2.24	2.32	2.05	6.61
Orono	15	3.02	2.47	2.47	7.96
Kapuskasing	19	2.33	3.43	2.94	8.70
Brantford	62	2.65	3.05	2.93	8.63
Guelph	55	2.89	3.24	2.87	9.00
Simcoe	23*	2.81	2.92	2.59	8.32

*Broken Period.

Table (4) illustrates that during the summer period when the maximum temperatures occur the area receives the smallest amount of precipitation. Thus, at a time when the evaporation is the greatest the total precipitation is the lowest.

The amount of water available for plant growth is a function of evaporation as well as precipitation. Evaporation is largely conditioned by temperature. Thornthwaite has devised a method of correlating these factors to determine the relative effectiveness of precipitation where evaporation figures are not available. Prince Edward County stands out as being one of the driest areas in the Province, having a Precipitation Effectiveness index of 9.5, closely followed by Leamington, the Niagara fruit belt and Renfrew.

The intensity and frequency of rains is important to plant growth, and particularly so, where the depth of soil over bedrock is shallow. According to Putnam and Chapman there is no agreement as to what constitutes a "drought" but it is generally felt that 1.0 inch or less of rain in a summer month is inadequate. From examination of records the total number of times that the rainfall fell within this limit for the months of May, June, July, August and September were noted. Over a fifty year period it was computed that the drought frequency of Prince Edward County would be 34, making it the most drought susceptive area in Southern Ontario.

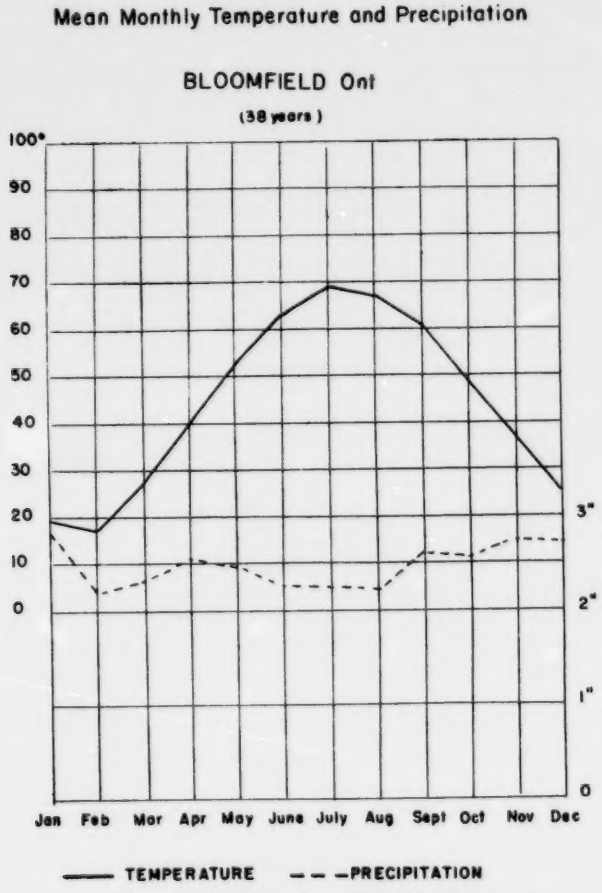


FIG. 5—Diagram showing Mean Monthly Temperature and Precipitation for Bloomfield.

A low precipitation effectiveness index, together with a high drought frequency and shallow soils, makes the soil moisture relationship in Prince Edward County a problem of concern. Although the shallow lighter textured

soils do respond readily to light rainfall, the necessity of using cropping and management practices that will conserve soil moisture cannot be over-emphasized.

The climate of Prince Edward County, modified by the presence of large bodies of water and low altitude, is suitable for the growing of a wide range of crops. Varieties of apples, pears and cherries commonly grown in Ontario survive the winters fairly well in this region.

Natural Forest Vegetation

The type of natural vegetation found in any area is a function of climatic and soil factors producing suitable environmental conditions in which plants can grow. Once established, vegetation in turn exerts considerable influence on soil formation. Comparing forests which are largely coniferous with those which are deciduous, there is obviously a wide variation in the character of the forest litter, particularly the relative toughness, consistency and the chemical content of the leaves.

In classifying and mapping soils, those features which can be observed in the profile are used as the criteria for making type separations. It is impossible to determine to what extent such features have been influenced by vegetation, since it is only one of several soil-forming factors. Neither is it the purpose of a soil survey to make a vegetation survey nor present a plant ecology report of an area. In an area such as Prince Edward County it would be indeed difficult to reconstruct a picture of the original vegetation because under present land use only about ten and one half per cent of the total land area is wooded.

There are however, certain combinations or associations of trees that occur more frequently on some soils than others. According to Halliday* the Prince Edward County area is included in the Huron-Ontario area of the Great Lakes-St. Lawrence Region. In this region the prevailing association is broad-leaved with a fair sprinkling of conifers. The main associations found in Prince Edward County are a combination of broad-leaved and coniferous trees, the former being the dominant component on the heavy and intermediate textured soils and the latter being found in larger quantities on the lighter textured soils and shallow soils over bedrock. Those associations that appear to be most commonly found include:

1. Sugar Maple, Elm, Beech Association

This association is common to the soils formed from limestone till, and the lacustrine soils. On the imperfectly drained Elmbrook and Solmesville series elm occurs more frequently than on the better drained series.

2. Red Cedar, White Cedar and Juniper Association

Red Cedar and Juniper dominate on the shallow limestone soils, with white cedar more frequently found on the moderately shallow soils. The Hillier clay loam supports this association as well as a fair sprinkling of maple and beech. The poorly drained pockets in the shallow limestone tablelands support white cedar.

*Halliday, W. E. D. "A Forest Classification of Canada" Forest Service Bulletin No. 89.

3. Sugar Maple, Beech and Pine Associations

The above association is common on the well drained light till and outwash soils. Sugar maple and beech predominate with a fair sprinkling of pine, particularly on the light textured outwash sandy soils.

4. White Pine Association

The light sandy soils in the Picton esker area supported a vegetative cover of white pine with a small sprinkling of oak and sugar maple. While few pines are left to-day the stump fences indicate that at one time the tree cover was dominantly white pine.

5. Black Alder, Elm, White Cedar Association

The above association is found on the poorly drained organic soils of the county. Elm predominates in the Big Swamp where much valuable timber has been left untouched. In the poorly drained marsh areas cattails and flags are the characteristic type of vegetation.

Figure (6) illustrates the distribution of the forest association in the county.

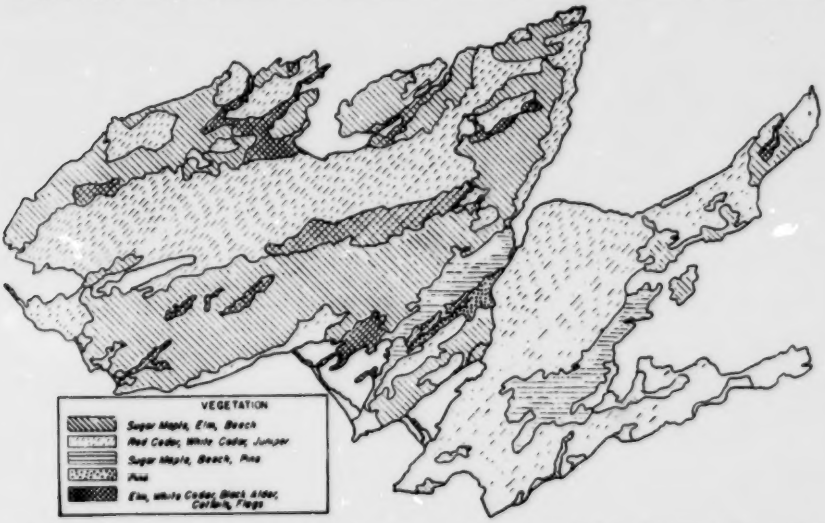


FIG. 6—Map showing the main forest associations in Prince Edward County.

Age

Prince Edward County lies within the zone that was covered by ice during the glacial period. The surface deposits owe their origin to the action of the ice itself or to the action of lakes and streams which existed during the retreat of the continental glacier. Most of the drift in the surveyed area has been derived from the underlying Paleozoic formations. Although the area was deeply covered by the waters of Lake Iroquois there are no extensive deposits of lacustrine origin. According to *Fairchild, the lower areas near the Bay

*Fairchild, N. C. Gilbert Gulf Marine Waters in Ontario Basin, Bull. Geol. Soc. Am. Vol. 17, 1905.

of Quinte and Lake Ontario were submerged in marine waters to which the name "Gilbert Gulf" has been given. This gulf was an arm of Champlain Sea which extended up the St. Lawrence River valley. According to † Antevs, Champlain Sea receded about 13,000 years ago. To what extent the Lake Iroquois deposits were modified by those of Champlain Sea is difficult to postulate. Suffice is it to mention that the soils developed on the water-laid deposits in this region show more maturity than those farther east, which would indicate that they are considerably older than the soils of the Ottawa Valley.

†Antevs, E. Late Quaternary Upwarpings of Northeastern North America. Journal of Geology, Vol. 47, 1939.

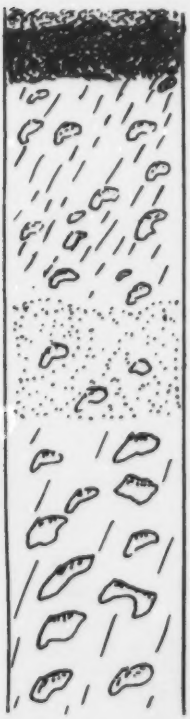
PART III

THE CLASSIFICATION AND DESCRIPTION OF PRINCE EDWARD COUNTY SOILS

The variability of Prince Edward County soils can be attributed to such factors as soil materials, drainage, texture, topography, etc. Approximately 60% of the County has only a shallow mantle of soil covering the underlying bedrock. Heavy textured lacustrine soils occupy about 10% of the area, light to medium textured soils (sands, sandy loams, fine sandy loams) about 6% and organic soils about 10%.

In the classification of soils, the type of profile which is found on the well drained sites within an area is usually considered first, because it is there the effect of regional climate and vegetation are most completely reflected. Soils developed under such conditions, even on varying parent materials, acquire similar characteristics and are referred to as *Zonal* soils.

The soils of Prince Edward County have developed under a warm humid climate and mixed forest vegetation with hardwoods predominating and exhibit the characteristics of the *Grey-Brown Podsolic* Great Soil Group. The horizons, which indicate the result of the zonal soil-forming processes, are shown in the following description of a Darlington loam profile located in Hallowell township. This profile developed under a hardwood forest in which maple and beech were the dominant trees.



A_{00}—and A_0—Partially decomposed organic matter, leaves, twigs, etc.

A_1 —3 inches dark grey brown loam; organic and mineral matter well incorporated; crumb structure; stone; pH 7.0

A_{21}—10 inches weak yellow brown loam; weak platy structure; stony; pH 6.6

A_{22}—3 inches very light yellow brown loam (bleached appearance); nuciform structure; somewhat compacted; stony; pH 6.8

B —7 inches chocolate brown clay loam; coarse nuciform to blocky structure; stony; pH 7.0

C —Highly calcareous loamy limestone till, containing a small proportion of shale fragments; pH 8.0

This profile is typical of the mature Grey-Brown Podsolic soils. Developed on limestone till with a fair proportion of shale, the horizons are well defined.

Whether or not the shallow soils (Farmington) or Prince Edward County should rightfully be included with the Grey-Brown Podsolic soils leaves room for speculation. The profiles of these soils lack the clear definition of colour and textural horizons found on the Grey-Brown Podsolic zonal soils described above. It is possible they more closely resemble the Brown Forest soils and should probably be included with that group.

The poorly drained soils of the County exhibit the characteristics of the Dark Grey Gleisolic Great Soil Group. Soils in this group are characterized by a fairly deep A_1 layer high in organic matter. The glei A_2 horizon is usually a light grey colour, often mottled with yellow brown. The structure of the A_2 horizon usually ranges from medium nuciform to medium blocky. The G (glei B) usually tends toward a massive structure.

Under conditions of still poorer drainage, layers of partially decomposed organic matter accumulate. When this layer is shallow the soil is referred to as a Half-Bog soil and the deeper organic deposits are called Bog Soils.

System of Classification

On the basis of their differentiating characteristics soils are grouped into categories which can be described and readily recognized. Three categories are commonly employed in the classification of soils in the field. Thev are (1) series (2) type and (3) phase. Those groups of soil developed on similar parent material but differing in characteristics of the solum due to differences of relief or drainage are included in the *soil catena*. Some soils exhibit little or no definite soil character, due to extreme stoniness, sandiness, hilliness, rockiness or some similar quality. Such conditions are classified as "Miscellaneous soils."

The soil series is a group of soils having genetic horizons similar as to differentiating characteristics and arrangement in the soil profile and developed from a particular type of parent material. Except for texture, particularly of the A_1 horizon, the physical characteristics and thickness of the various horizons should not vary significantly within a series. Such characteristics include colour, structure, organic matter content, reaction and texture with the exception of the A_1 horizon. The series is given a geographical name, usually that of some local feature commonly associated with the area where it was first recognized and mapped. A soil series consists of one or more types differentiated on the basis of texture.

The soil type is the principal unit of mapping and, because of its specific character, is usually the soil unit to which agronomic data are related. A soil type name consists of a series name plus the textural class name determined principally from the texture of the A_1 horizon.

A phase is a subdivision of a soil type used to show variations from the normal in topography, stoniness, or erosion. In two instances in this report it has been used to differentiate the depressional areas of the shallow soils underlain by limestone bedrocks. (Farmington and Ameliasburg.)

DIFFERENTIATION OF PRINCE EDWARD COUNTY SOILS ACCORDING TO SOIL MATERIALS AND DRAINAGE

	Acreage Mapped
A. SOILS FORMED FROM LIMESTONE TILL	
(i) Good drainage	
1. Darlington loam	13,300
B. SOILS FORMED FROM LACUSTRO-MARINE DEPOSITS OVER LIMESTONE TILL	
(i) Good drainage	
1. Waupoos clay	6,000
(ii) Imperfect drainage	
1. Solmesville clay loam	1,300
C. SOILS FORMED FROM LACUSTRO-MARINE MATERIALS	
(i) Good drainage	
1. South Bay clay	3,400
2. South Bay clay loam	4,800
(ii) Imperfect drainage	
1. Elmbrook clay	14,500
2. Elmbrook clay loam	4,600

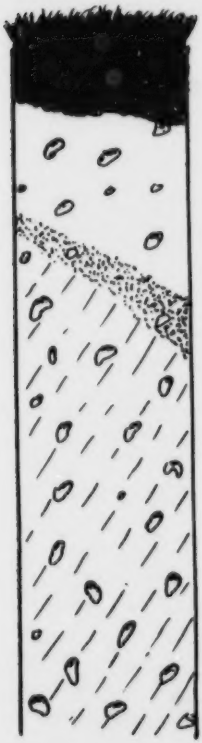
	Acreage Mapped
D. SOILS FORMED FROM FLUVIO-GLACIAL MATERIALS	
(i) Good drainage	
1. Pontypool sandy loam	3,000
2. Pontypool sand	1,400
E. SOILS FORMED FROM OUTWASH MATERIALS	
(i) Good drainage	
1. Brighton gravelly sandy loam	1,100
2. Brighton sandy loam	5,000
3. Percy fine sandy loam	4,000
(ii) Imperfect drainage	
1. Tecumseth sandy loam	4,200
(iii) Poor drainage	
1. Granby sandy loam	850
F. SHALLOW SOILS UNDERLAIN BY LIMESTONE BEDROCK	
(ia) Shallow	
1. Farmington loam	48,600
2. Farmington loam—imperfectly drained	6,500
(ib) Moderately shallow—good drainage	
1. Ameliasburg clay loam	25,200
2. Ameliasburg clay loam—imperfectly drained	5,000
3. Ameliasburg loam	25,600
4. Athol sandy loam	2,700
(ic) Moderately shallow, good drainage, derived from shaley limestone materials	
1. Hillier clay loam	25,600
(ii) Moderately shallow, fair to poor drainage	
1. Gerow clay loam	11,600
G. MISCELLANEOUS SOILS	
1. Eastport sand	1,400
2. Marsh	13,300
3. Muck	13,100
4. Bottom land	950
5. Rock	2,500

A. SOILS FORMED FROM LIMESTONE TILL

The limestone till soils are developed on medium to heavy textured calcareous till derived largely from Trenton limestone and containing a fair proportion of shale. The unweathered or slightly weathered drift contains numerous angular stones and the occasional boulder interspersed among a loamy matrix. The materials are commonly associated with ground moraines. The depth of till deposit over the bedrock is usually greater than three feet. The Darlington is the only catenary member mapped in Prince Edward County.

Darlington Loam (13,300 acres)

Characterized by slightly to strongly rolling topography, the Darlington series occupies slightly over 5% of the surveyed area. The underlying till is derived largely from Trenton limestone. A typical cultivated profile exhibits the following characteristics:



A_c —4-6 inches dark brown loam; medium organic matter; crumb structure; frequent stones; slightly alkaline reaction; pH 7.4.

A_{21}—8-10 inches yellow brown stony loam; weak platy structure; pH 7.2.

A_{22}—2-3 inches grey bleached loam; stony; slightly cemented; pH 7.4.

B —2-4 inches dark brown clay loam; frequent stones; nuciform structure; pH 7.6.

C —Grey, calcareous till; contains frequent limestone and shale fragments; pH 8.0.

The topography varies from slightly to strongly rolling. Most of the slopes range from 5-10% with an occasional steeper one. The topographical features do not interfere with cultivation.

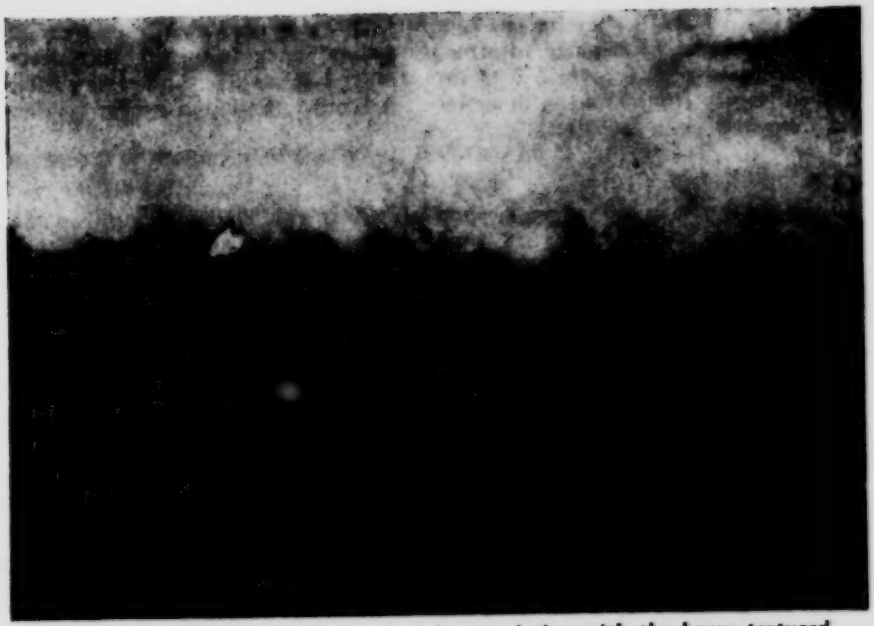
Both external and internal drainage are good.

Although Darlington loam has suffered slightly from sheet erosion, it has not seriously affected the capability of the type for agricultural use.

Sugar maple and beech are the dominant trees found on the soil. Elm occurs occasionally, particularly at the bottom of the slopes.

Agriculture

Most of the Darlington loam is cleared of trees and used for dairy and specialized farming. This soil is well adapted to the growing of alfalfa, clovers and corn. Canning crops are frequently grown. With the exception of stoniness, the Darlington soil with its friable consistency and loamy texture can be cultivated with ease. Organic matter and fertility maintenance are necessary for successful crop production.



Till ridges of Darlington loam occur in association with the heavy-textured stonefree clay. Frequently they are used for building sites.

The till soils support a tree growth consisting largely of hard maple and beech. This association occurs on the well drained medium-textured soils of the County.

B. SOILS FORMED FROM LACUSTRO-MARINE DEPOSITS OVER LIMESTONE TILL

The soils contained in this group occupy about 3% of the total area of the County. The water-laid lacustro-marine deposits are underlain by limestone till similar to that of the Darlington series. Since they are mapped in association with limestone till soils, stones occasionally occur on the surface. Two series were mapped in this group, the Waupoos and Solmesville. The land use capabilities and characteristics of the Waupoos resemble the South Bay series, while the properties of the Solmesville have much in common with the Elmbrook.

Waupoos Clay (6,000 acres)

Formed from lacustro-marine materials overlying calcareous till, the Waupoos clay is found in Ameliasburg, North Marysburg and Hallowell Townships. It is the well drained member of the Waupoos catena of which the Solmesville is the imperfectly drained member. Occasionally the lacustrine material is modified by the underlying limestone till which occurs at depths of three feet and less. On the knolls the veneer of lacustrine material may be very shallow and the underlying till turned up by plowing.

A cultivated profile exhibits the following characteristics:

A_c —4-6 inches dark brown clay and clay loam; organic matter medium; crumb structure; occasionally a few angular stones appear where mapped in close association with till soils; pH 6.8.

A_{21}—6-8 inches yellowish brown clay loam; medium nuciform structure; brittle consistency; pH 6.2.

A_{22}—2 inches bleached grey clay; medium nuciform structure; brittle consistency; slightly mottled; pH 6.8.

B —2-4 inches dark brown clay; coarse blocky structure; brittle and compacted consistency; pH 7.0; occasionally layer of stone-free material under the B is narrow.

C —Grey brown plastic clay; pH 7.4; underlain by grey stony calcareous till; pH 8.0.

Occasionally bedrock occurs within 3 feet of the surface but for the most part it is greater than this depth. The topography ranges from undulating to slightly rolling. Sheet erosion may occur on the rolling knolls, particularly if the land is being used for hoe crops.

The drainage of the Waupoos series is variable over most of the area. The topographical features facilitate adequate external drainage. However, there are small areas where mottlings occur in the lower A_2 horizon and the downward movement of the water is impeded by the heavy clay layers. This condition is not common.

The dominant tree growth found on the Waupoos clay was elm, maple and beech. Few woodlots remain on this type.

Agriculture

The type is well adapted to the growing of small grains and hay; good crops of alfalfa and red clover are produced on this soil. Canning crops of tomatoes, corn and peas, as well as orchards, grow well on the lighter textured clay loam areas. This soil has a tendency to remain wet late in the spring and spraying equipment is moved with difficulty over the sticky clay. In the shallow areas the type becomes quite droughty in late summer at a time when fruit trees draw heavily upon the soil moisture.

The organic matter supply is medium and in general the fertility levels can be fairly well maintained by the application of barnyard manure. The physical properties of the soil are such that it puddles and bakes readily, which makes it rather difficult to work in the spring. Maintenance of good tilth is necessary to the successful management of the Waupoos soil.

Solmesville Clay Loam (1,300 acres)

The Solmesville clay loam is the imperfectly drained member of the Waupoos catena. It is one of the minor types of the county and for the most part is found in Sophiasburg Township in the Solmesville area. A common Solmesville clay loam profile exhibits the following characteristics:

A_c—4-6 inches dark brown clay loam; few stones; medium to high organic matter; crumb structure; pH 7.4.

A_2—6-10 inches greyish brown mottled clay loam; intensity of mottlings increases with depth; blocky structure poorly developed; pH 7.2.

B —8-12 inches grey mottled clay loam; coarse blocky structure; colour and structural characteristics poorly defined; pH 7.6.

C —The mottled clay is underlain by heavy, stony, calcareous till at depths ranging from 2-3 feet; pH 8.0.

The topography of the Solmesville clay loam ranges from level to slightly undulating. Little or no erosion occurs on this type. Both external and internal drainage are imperfect. Internal drainage is impeded by the heavy texture while the topography does not facilitate ready external drainage.

Tree cover is made up of elm and red maple as evidenced by the fairly large portion of the type still in woodland.

Agriculture

Growing of hay crops and pasture are the chief uses made of the Solmesville clay loam. Because of imperfect drainage, it is a late soil in the spring with the result that buckwheat is one of the more important small grains grown on the type. Soil management problems are aggravated by the high clay content. The type is fairly well supplied with plant nutrients.

C. SOILS FORMED FROM LACUSTRO-MARINE MATERIALS

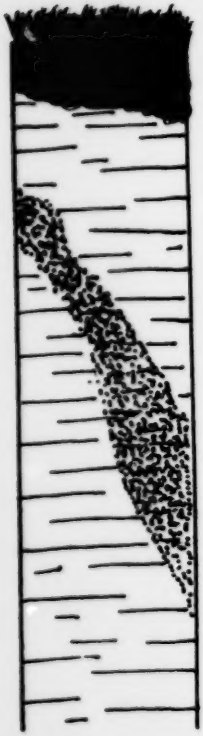
On the west end of Big Island, on Huff Island and Massassauga Point, extensive areas of stonefree heavy clay occur. These materials were deposited in the western extension of Gilbert Gulf and to what extent they were modified by the lacustrine waters of the Ontario basin is difficult to postulate. The South Bay is the well drained member of the catena bearing the same name and the Elmbrook is the imperfectly drained member.

SOUTH BAY SERIES

The South Bay series is formed from heavy, sedimentary marine clay materials, and is the well drained member of the catena of the same name. Two types were mapped in this series, the South Bay clay and the South Bay clay loam.

South Bay Clay (3,400 acres)

The following is a description of a cultivated South Bay clay profile:



A_e —4-6 inches of light brown clay; stonefree; crumb structure; medium organic matter; friable consistency; pH 6.6.

A_{21}—8-10 inches yellowish brown clay; stonefree; weak platy structure; slightly hard consistency; pH 6.4.

A_{22}—2-3 inches bleached yellowish brown clay;weak platy structure; fairly friable; pH 6.8.

B —10-12 inches dark brown clay; stonefree; blocky structure; firm consistency; pH 6.8.

C —Grey clay; compact; massive structure; pH 7.2.

The veneer of clay over bedrock exceeds three feet in depth over most of the area mapped. Shallow areas, where the bedrock is not far removed, become very droughty in periods of low precipitation.

The topography ranges from undulating to slightly rolling. Sheet erosion has not affected this soil type seriously except on the occasional long slope. The external drainage is good but the internal drainage is often rather slow due to the high clay content and the massive consistency of the B horizon.

Elm, maple and beech comprised the original forest growth. Only a small portion remains in woodland at the present time.

Agriculture

Dairy farming is carried on extensively on this type. Cereal grains, hay and canning crops grow satisfactorily, and in the Waupoos Peninsula a few orchards are found on the well drained heavy clay. With satisfactory cultural practices, orchards appear to thrive on this soil. The heavy texture of the South Bay clay makes it difficult to manage since it has a tendency to puddle when wet and bake when dry.

South Bay Clay Loam (4,800 acres)

The most extensive areas of South Bay clay loam are found in Ameliasburg Township, the South Bay district of South Marysburg Township, and the Waupoos district of North Marysburg Township. In addition, other small areas were mapped wherever marine deposits occur in the County.

Formed from stonefree sedimentary marine deposits, the soils of this type occupy a slightly larger acreage than the South Bay clay. A cultivated South Bay clay loam profile exhibits the following characteristics:

A_c—4-6 inches dark brown clay loam; stonefree; crumb structure; soft consistency; medium organic matter; pH 6.8.

A_2—12-14 inches yellow brown clay loam; stonefree; weak platy structure; occasionally slight mottling may occur in the lower part of the horizon; pH 6.6. A thin grey bleached layer occurs above the B.

B —10-12 inches dark brown clay; stonefree; medium blocky structure; firm consistency pH 6.8.

C —Grey-brown silt and clay; stonefree; free carbonates usually occur, particularly if the bedrock is not far removed; pH 7.6.

As in the case of the South Bay clay, the deposit of materials over the bedrock is variable but usually exceeds 3 feet in depth.

With the exception of small level to slightly depressional areas, that are not sufficiently large to plot on an inch to the mile scale of mapping, the South Bay clay loam has an undulating topography which facilitates external drainage. Over most of the type, the internal drainage is good to fair. However, in the included areas of level and depressional topography, mottlings occur in the A_2 horizon indicating an imperfectly drained condition.

Very little erosion has taken place on this type which is well suited to orcharding and the growing of canning crops.

Although very little remains in woodland at the present time, it originally supported a tree growth of hardwoods. Elm, maple and white ash appear to have dominated the original woodland.

Agriculture

The undulating topography, friable consistency, and adequate nutrient supply adapt the South Bay clay loam to the growing of fruit trees. One of the main objectives in orchard soil management is to build up the dark surface or organic layer. This may be accomplished by the addition of decomposing vegetable matter such as green manure, old hay, straw, or barnyard manure. From previous orchard soil surveys it was noted that some form of mulch

This practice of burning spoiled hay and straw should be discouraged. The building-up of organic matter content for moisture conservation is very important in Prince Edward County soils. If not wanted on this field it could be used as a mulch in an orchard.

system is better adapted to the maintenance of organic matter than is clean cultivation. This is particularly applicable to Prince Edward County, since soil moisture conservation is so important.

Tomatoes and corn are grown on the South Bay clay loam with good results. Maintenance of organic matter is a major fertility problem. The farm income is usually derived from a combination of dairy farming, canning crops and orcharding. Such a combination works very well, the barnyard manure obtained from the dairy herds being used to good advantage in maintaining the organic matter content of the soil. With suitable climatic conditions, good crops of cereal grains and hay are produced on this type. Although not grown extensively, alfalfa can be produced successfully. Few farmers use commercial fertilizers.

ELMBROOK SERIES

The Elmbrook series occupies slightly over 7.5% of the area and is the imperfectly drained member of the South Bay catena. It differs from the South Bay in that the profile is mottled and less well developed. When bedrock occurs at depths of three feet and less, the soil has been mapped as a shallow phase of the Elmbrook series.

Elmbrook Clay (14,500 acres)

The Elmbrook clay is found most extensively in the western part of Big Island, Huff Island and Massassauga Point areas.

The following is a description of a cultivated Elmbrook clay profile:

A_c—4-6 inches light brown clay; stonefree; medium to low organic matter; crumb structure: friable consistency; pH 6.6.

A_2—10 inches yellow brown mottled clay loam; nuciform structure; firm consistency; pH 6.4.

B —8-10 inches light brown mottled clay; blocky structure; brittle consistency; structural and textural difference between A_2 and B horizon well defined; pH 7.0.

C —Heavy plastic, stonefree grey brown clay; massive structure; pH 7.2; usually contains free carbonates.

The external drainage is moderate, except in the small depressional areas. The heavy nature of the clay layers makes the internal drainage slow. The topography ranges from nearly level to undulating. Small poorly drained depressional areas are included with the broad undulating plains. Little or no erosion has occurred on the Elmbrook clay.

Tree growth was made up largely of elm and maple, with a lesser amount of ironwood.

Elm are found in large numbers on the undulating Elmbrook clay plains. This series should respond to tile draining.

Agriculture

Most of the Elmbrook clay has been cleared and tilled. Under improved drainage conditions, it is adapted to general farming and the growing of small grains and hay. Because of its high clay content, the Elmbrook has a tendency to puddle when wet and bake when dry. It has a narrow range of moisture content in which it can be cultivated satisfactorily.

In the early days of settlement, the Elmbrook clay was used for the production of barley for export to the United States. Under present land use, it is used extensively for dairy farming. Hay crops of timothy and alsike do well but the type is poorly adapted to red clover and alfalfa because of drainage limitations. Canning crops, especially tomatoes, are grown in fairly large quantities. The heavy texture and impeded drainage make it ill-suited for orcharding purposes. Organic matter maintenance is one of the main management problems associated with the Elmbrook soils.

Elmbrook Clay Loam (4,600 acres)

Most extensively located in Ameliasburg Township, the Elmbrook clay loam differs from the clay in having a more friable and workable surface soil. A cultivated profile exhibits the following characteristics:

A_c—6 inches dark brown clay loam; stonefree; crumb structure; medium organic matter; pH 6.8.

A_z—10-12 inches grey silty clay loam; medium nuciform structure; mottlings frequently occur in this horizon; stonefree; pH 6.6.

B —8-10 inches mottled brown clay loam; coarse blocky structure; pH 7.0.

C —Grey-brown clay and silt; stonefree; massive; slightly calcareous; pH 7.2.

The Elmbrook clay loam occurs in broad level plains, occasionally dissected by a stream course. Both the external and internal drainage are imperfect. Provided the mantle of soil over the limestone bedrock is sufficiently deep, the installation of tile drains would greatly facilitate the removal of water. Where the bedrock is close to the surface, there is a tendency for the soil to suffer from excess moisture during wet periods and become extremely droughty in dry periods. The erosion hazard on the Elmbrook soils is very small.

The common trees on the clay loam are similar to those of the clay and consist of elm, red maple and ironwood.

Agriculture

Provided drainage improvement is effected, this type is adapted to general farming and the growing of small grains and hay. The surface soil is more friable than that of the clay and there is not the same tendency for the soil to puddle and bake.

Cereal grains, red clover and alfalfa do fairly well on the better drained areas. Dairy farming is carried on with considerable success and provides large quantities of manure which is used to advantage in attempting to maintain an adequate organic matter content in the soil.

Some orchards are located on this type, as well as canning crops of tomatoes, peas and corn. For the most part, the agriculture of the Elmbrook clay loam is quite similar to that of the Elmbrook clay. However, because of the lighter clay loam texture, it is better adapted to the growing of peas and corn.

D. SOILS FORMED FROM FLUVIO-GLACIAL MATERIALS

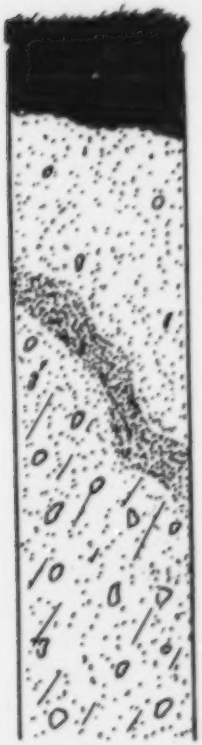
The fluvio-glacial soils found in Prince Edward County are characterized by sandy materials and rolling to steeply rolling topography. Located for the most part in the central section of the County, the materials were deposited by water flowing through the ice at the time the area was covered by the glacier. The materials range from poorly sorted coarse sand and gravel to gravelly sandy till.

PONTYPOOL SERIES

The pontypool series occupies less than 2% of the land area of Prince Edward County. It is developed from poorly sorted fluvio-glacial materials, which occur for the most part in the central section of the County. Only the well drained member of the Pontypool catena was mapped.

Pontypool Sandy Loam (3,000 acres)

The Pontypool sandy loam occurs as a rolling plain of stony, sandy calcareous drift derived chiefly from Trenton limestone. This type frequently occurs as long oval ridges, particularly in the West Lake district. The sandy materials on the crowns of these ridges are usually much deeper than on the edges. The Pontypool sandy loam profile exhibits the following characteristics:



A_e —5-7 inches brown sandy loam; medium to low organic matter; crumb structure; few stones; pH 6.2.

A_{21}—15-20 inches yellow brown sandy loam; weak platy structure; few stones; pH 6.0.

A_{22}—4 inches light yellow brown sandy loam; single grain structure; slightly compacted; occasional stone; pH 6.4.

B —6 inches brown loam; small nuciform structure; compact; occasional stones; pH 6.6.

C —Light grey, sandy, stony calcareous till; pH 7.2.

The topography of the Pontypool sandy loam varies from undulating to strongly rolling. In the Bloomfield-West Lake area elongated oval hills are common. Due to the character of the topography and the high proportion of row crops grown on the Pontypool soils, protective measures should be used to control the erosion hazard. For the most part, the slopes of this type range from 5-15%. Both the external and internal drainage are good.

Although very little uncleared land remains on the type, maple and beech appear to have been the dominant trees.

Agriculture

A wide range of crops are grown on this soil. The Pontypool sandy loam is an early soil, can be cultivated with ease and is well adapted to the production of corn, peas and tomatoes. Usually the farm business consists of a combination of dairying, canning crop production and fruit growing. Since

the sandy loam requires heavy applications of manure to maintain and build up the organic matter content, the combination of dairy farming and growing of canning crops works out very well.

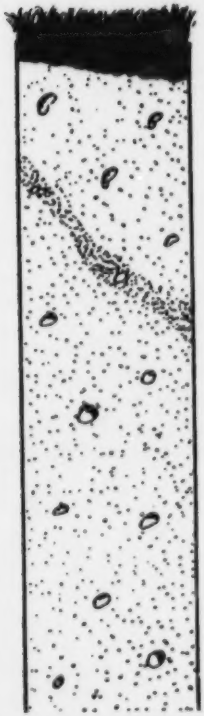
Cereal grains, tree fruits and hay do well on the Pontypool sandy loam. For the most part, this type is located close to good markets and this, along with its adaptibility for growing a wide range of crops, make it one of the better agricultural soils in the area.

Agriculturally, the Pontypool sandy loam possesses much better qualities than the Pontypool sand. It has a greater moisture retaining capacity, a higher fertility level and is less susceptible to erosion.

Some attractive farmsteads are found on the rolling Pontypool sandy loam. It is well suited to the successful production of crops commonly grown in the County.

Pontypool Sand (1,400 acres)

Most of the Pontypool sand mapped in Prince Edward County is found on the Picton esker. This type is characterized by materials ranging from coarse sand to cobbly gravel, a deeply weathered profile and steep topography. The following profile description indicates the characteristics of this soil type.



A_e—4-6 inches dark brown sand; some cobblestones; low in organic matter; single grain structure; pH 6.2.

A_2—6-15 inches yellow coarse sand; some cobblestones; single grain structure; pH 5.8.

B —2-3 inches brown sandy loam; tending to a weak nuciform structure occasionally poorly defined; pH 6.6.

C —Calcareous; cobbly grey sand and gravel; pH 7.2.

The topography ranges from slightly to steeply rolling. Usually the slopes occur in the 8-15% class although the occasional 15-25% slope is found. The topographic characteristics of this soil type make it susceptible to both water and wind erosion.

The rolling topography and coarse textured materials result in good to excessive drainage and rather low moisture-holding capacity.

White pine, maple and poplar are the most common trees found on the Pontypool sand.

Agriculture

This type is most commonly used for growing canning crops, potatoes and pasture. The main problem in crop production is low fertility and excessive drainage. Provided efficient fertility practices are employed, the type produces fair crops of tomatoes and corn. Potatoes are grown with fair success. Red top and Canada blue are the most common grasses found in the pastures Because of its droughty nature it is not well suited for pasture purposes

This area of Pontypool sand has been cut over and soft maple and poplar have replaced the original pine. The sand type has a much lower fertility level and is more susceptible to wind erosion than the sandy loam.

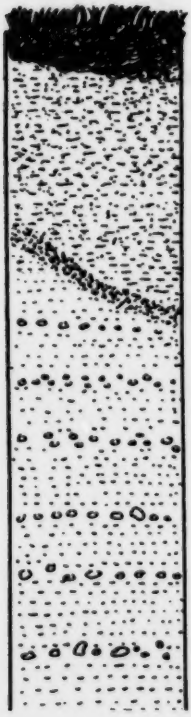
E. SOILS FORMED FROM OUTWASH MATERIALS

The soils formed from outwash materials are characterized by level to slightly undulating topography, and freedom from stones, except in the case of the Brighton gravelly sand. The Brighton catena of which the Brighton is the well drained member, the Tecumseth the imperfectly drained member and the Granby the poorly drained member is developed on the outwash materials.

Brighton Sandy Loam (5,000 acres)

The Brighton sandy loam is formed from coarse sandy, well-sorted outwash materials. In the Picton—West Lake area of Hallowell Township a fairly broad tract occurs in association with the Picton esker. Most of the Brighton sandy loam mapped is located in the Cherry Valley district of Athol Township and along the Black River of South Marysburg Township.

The characteristics of the Brighton sandy loam profile are described as follows:



A_e—4-6 inches brown sand to sandy loam; stonefree; organic matter low; single grain and crumb structure; pH 6.0.

A_2—12-15 inches yellow sand; stonefree; single grain structure; pH 5.8.

B —2-3 inches brown sandy loam; stonefree; very weak nuciform structure; occasionally poorly defined texturally but usually a well developed colour horizon is present; pH 6.3.

C —Well-sorted grey calcareous sand and gravel; pH 7.4.

Undulating to slightly rolling topography characterizes the Brighton sandy loam. The type has a low organic matter content and frequently the vegetative cover in permanent pastures is not sufficiently thick to prevent wind erosion from taking its toll. In the Black River district "live" gullies are growing into the cultivated fields along the stream courses.

In spite of its level to undulating topography the type is well drained and in some cases internal drainage is excessive since the physical nature of the soil facilitates the rapid percolation of moisture. The organic matter content of the surface soil is low, resulting in a low soil moisture-holding capacity.

Like most of Prince Edward County soils the Brighton sandy loam has been denuded of most of its forest cover. Fence rows and stumps indicate that pine, oak, poplar and maple probably have been the most commonly occurring trees on the well drained sandy loam.

Agriculture

Low organic matter, excessive drainage and low natural fertility limit the capability of this type for the production of most crops. Canning crops are grown and provided adequate supplies of manure and fertilizers are applied, fair yields are obtained.

The type presents fair possibilities for orcharding, if adequate fertility levels are established and maintained. Permanent pastures suffer from wind erosion, particularly on the more undulating locations.

Brighton Gravelly Sand (1,100 acres)

The Brighton gravelly sand differs from the sandy loam in that the surface soil contains numerous well-rounded stones and cobbles and the underlying materials are gravelly and cobbly. This type usually occurs as low-lying elongated ridges. A good exposure of the sandy gravel, referred to locally as "pidgeon gravel", can be seen along the West Lake road about 80 rods from the entrance to the Sand Banks. The Brighton gravelly sand is also found in small level areas, usually in association with the Trenton limestone escarpments. The profile exhibits the following characteristics:

A_1—2-4 inches light brown gravelly sand; single grain structure; stony; organic matter low; pH 6.5.

A_2—Yellow sand; single grain structure; stony; variable thickness; pH 6.2.

B —3-5 inches brown sandy loam; very weak nuciform structure; pH 6.6.

C —Well-sorted grey gravel; pH 7.4.

The topography of the gravelly ridges is rolling. Where the ridges are spread out to cover a reasonably large expanse, the topography is usually undulating. The type has not been greatly affected by either wind or water erosion.

The internal and external drainage of the Brighton gravelly sand are good to excessive. The open nature of the soil allows rapid internal movement of water, creating an almost droughty condition in the type.

Pine, oak, maple and poplar were the trees most commonly found on this soil.

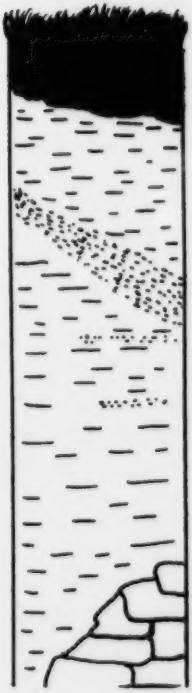
Agriculture

Since the Brighton gravelly sand often occurs as narrow ridges the agricultural practices vary according to the soil type with which it is associated. In Hillier and Hallowell Townships dairying and growing of specialized canning crops are commonly practised on the gravel ridges. The coarse, open, gravelly materials tend to make the ridges droughty but with heavy applications of manure they appear fairly well suited to the growing of hay crops and tomatoes. For the most part, the depth of gravelly sand exceeds three feet. However, in areas where the bedrock does occur at shallow depths along with the coarse materials, an extremely droughty condition prevails.

Percy Fine Sandy Loam (4,000 acres)

The Percy fine sandy loam is developed on fine sandy, stonefree outwash materials. The type is found in Hallowell Township close to Highway No. 14 on the Picton-Bloomfield road, in Athol Township on the south side of East Lake and in South Marysburg Township west of the village of Milford. Over half of Waupoos Island is covered with friable, fertile Percy fine sandy loam. Bedrock influences a fairly large portion of the soil, resulting in a shallow profile, 18 inches to 36 inches in depth. The closeness of bedrock tends to make it droughty in periods of low rainfall. The chief difference between the Brighton and Percy series is one of texture, the former having developed on well-sorted coarse sandy materials and the latter on well-sorted fine sandy materials.

The following profile description of a cultivated Percy fine sandy loam profile indicates the characteristics of the type.

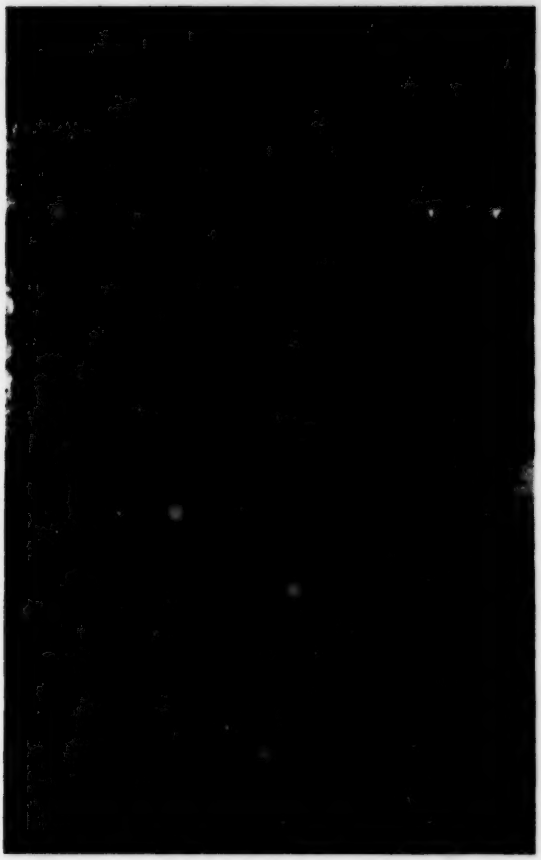


A_c—4-6 inches brown fine sandy loam; stonefree; medium organic matter; crumb structure; soft consistency; pH 6.2.

A_2—6-10 inches yellow brown fine sandy loam; stonefree; single grain to weak platy structure; soft consistency; pH 5.8.

B —2-5 inches dark brown loam to clay loam; small nuciform structure; consistency slightly hard; pH 6.4.

C —Heavy loam to clay loam; pH 7.2. Occasionally silt layers occur in conjunction with the loam and clay loam. Limestone bedrock may appear at depths of 3 feet and less.



The Percy fine sandy loam is developed on fine-textured stonefree materials. It is well suited for the growing of a wide range of crops.

The topography ranges from undulating to slightly rolling. Since a large portion is being used for the production of canning crops, protective measures should be employed to control water erosion.

The soft consistency allows for ready penetration of surface water. Over most of the area there is sufficient fall to assure adequate external drainage.

Maple, oak, choke cherry and elm constitute the most commonly recognized trees on the Percy fine sandy loam.

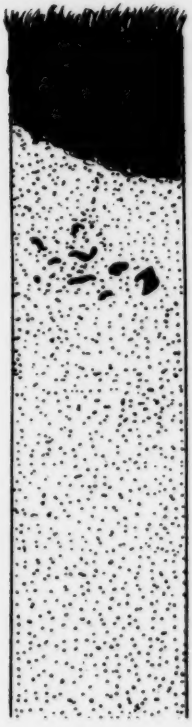
Agriculture

This soil is adapted to growing a wide range of crops. Good crops of tomatoes, corn and peas, as well as small fruits, are produced. Favorable physical and chemical properties make it especially suited to the production of most specialized crops.

Where the land is not used for the production of specialized crops, dairy farming is successfully conducted. The type is well suited to the production of small grains and hay. Provided the soil materials are sufficiently deep, fairly good orchards can be established but the appearance of bedrock at shallow depths results in a shallow rooting system and greatly lessens the suitability of the soil for this purpose.

Tecumseth Sandy Loam (4,200 acres)

Most of the Tecumseth sandy loam mapped in Prince Edward County is located close to the County boundary in Ameliasburg Township. Formed from outwash sandy materials, this soil is the imperfectly drained member of the Brighton catena. A commonly occurring profile is described as follows:



A_c—6-10 inches dark brown sandy loam; crumb structure; stonefree; organic matter medium; pH 7.0.

A_2—10-15 inches greyish yellow sand to sandy loam; single grain structure; stonefree; mottling may appear in the upper part of the A_2 becoming more intense with depth; pH 6.8.

B —4-6 inches mottled sandy loam; single grain structure; poorly developed textural horizon; pH 7.0.

C —Grey sand and silt; well-sorted; calcareous; pH 7.6.

The topography is almost level to slightly undulating. This soil type has not been eroded to any noticeable degree.

The external and internal drainage are imperfect.

Tree growth consists of white cedar, elm and an occasional tamarack. A fair proportion of the Tecumseth sandy loam supports a tree cover under present land use.

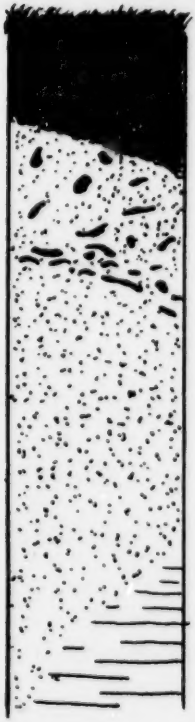
Agriculture

Most of the Tecumseth remains in pasture with dairy farming being carried on to some extent. Because of the imperfect drainage, there is little successful tree fruit production but fair crops of tomatoes are grown where drainage is adequate. The natural fertility is low and sound fertility-building practices must be employed to permit the successful production of most crops. In abnormally wet springs large acreages of buckwheat are grown.

Some orchards have already been established and could be improved if the soil were tile drained. Under natural drainage conditions the type is fairly well supplied with organic matter. However, with improved drainage and more intensive cropping, maintenance of adequate organic matter content and nutrient levels becomes a soil management problem.

Granby Sandy Loam (850 acres)

Formed from well-sorted outwash sandy materials, the Granby sandy loam is a neutral to alkaline soil with poor natural drainage. It generally occurs in depressional areas. Areas too small to map occur in association with the Tecumseth sandy loam. The Granby series is the poorly drained member of the Brighton catena. Other than the striking colour difference between the dark cultivated layer and the underlying drab grey materials the profile is somewhat featureless. The Granby exhibits the characteristics of the Dark Grey Gleisolic Great Soil Group.



A_c—6-10 inches dark brown sand; single grain structure; high organic matter; pH 7.2.

A_2—5-10 inches grey or grey mottled sand; single grain structure; pH 7.2.

G —10-20 inches greyish brown and yellowish brown sand with rusty mottling; single grain structure; pH 7.2.

C —Grey sorted coarse calcareous sand, sometimes grading into heavy plastic clay at depths of 3 feet or more; pH 7.6.

Granby sandy loam occurs in areas with level and depressional topography. Both the external and internal drainage are poor. Due to its topographic position it is usually difficult to drain and as a result the cost of drainage improvement may be uneconomical and prohibitive. However, where drainage improvement can be effected without too much difficulty the capability of this soil to produce crops is greatly increased. The feasability of drainage improvement on Granby soils will be strongly influenced by the type of crops to be grown. For high value cash crops drainage improvement would be desirable, whereas, it is very doubtful if the cost of draining would be warranted for low value grain crops or pasture lands.

Tree growth consists largely of elm, soft maple, cedar and spruce.

Agriculture

Very few good farms are developed entirely on the Granby soils, which produces only fair crops of hay and pasture.

The production of most crops is limited by the poor drainage condition. However, once it is improved the retention of water and organic matter is a problem because of the coarseness of the materials. Much of the Granby is serving a very useful purpose when left in permanent pasture or woodland.

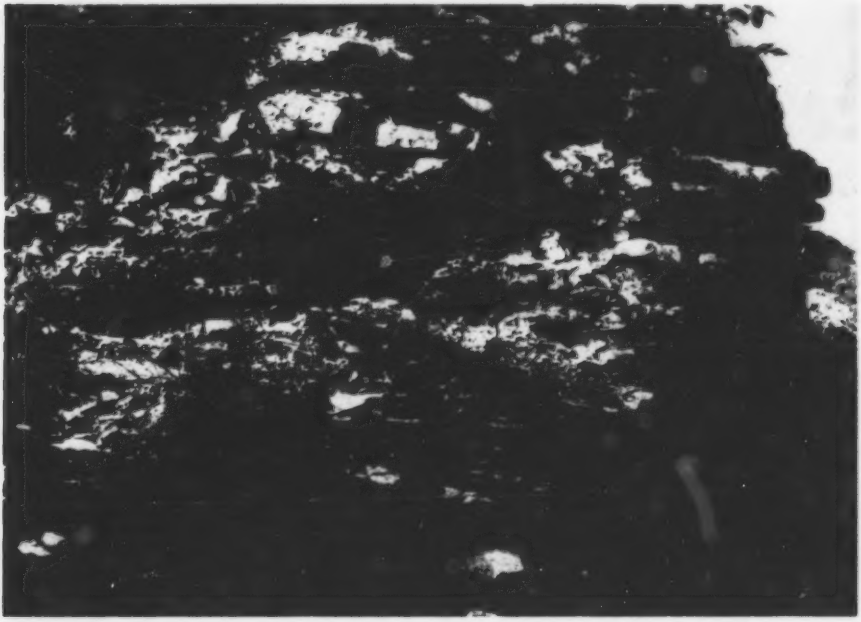
F. SHALLOW SOILS UNDERLAIN BY LIMESTONE BEDROCK

Approximately 60% of the soils of Prince Edward County have a shallow mantle of soil underlain by limestone bedrock. A large proportion of the area has a covering of less than one foot. However, in spite of this limitation, the agricultural potentialities of the shallow soils are significant. Although Prince Edward County occurs in an area of low precipitation for the Province of Ontario and is subject to frequent droughts, the moderating influence of large bodies of water permits the growing of a wide range of relatively high value orchard and canning crops. The capability of the shallow soils to produce crops is influenced by the nature and depth of the drift covering the bedrock.

During the progress of the soil survey, it was deemed desirable to separate the soils having less than one foot of soil materials underlain by bedrock from those having three feet and less. This necessitated the setting up of arbitrary standards for separation and required considerable traversing on foot to delineate the shallow areas. It is not uncommon to find the buildings located on a ridge of shallow soil at the front of the farms with the better and deeper soils farther back Such areas were traversed in an effort to establish a boundary between the very shallow and moderately shallow soils. Due to the unevenness of the upper surface of the bedrock, difficulties arise in making arbitrary separations. It is also well to reflect that even on the moderately shallow soils, although the capability to produce crops is much better than on the very shallow areas, the depth to bedrock is still a major limiting factor in crop production.

Soils with one foot and less of soil material over bedrock were mapped as the Farmington series. Those with depths of materials ranging from one to three feet were placed in the Ameliasburg series. The Hillier series differs from the Farmington and Ameliasburg series in the large proportion of limestone fragments contained in the surface soil. The Hillier series is underlain

by thin beds of limestone with frequent shale partings while the bedrock underlying the Farmington and Ameliasburg is more massive. The Gerow series is the poorly drained associate of the heavy textured moderately shallow soils.



This picture shows the friable nature of the underlying limestone bedrock. The limestone is seamed and interbedded with shale partings.

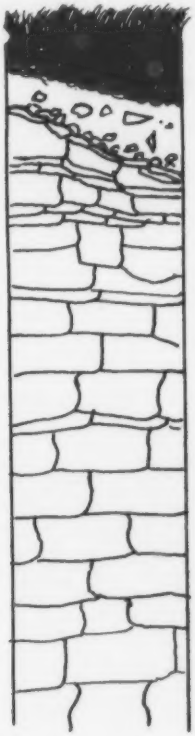
FARMINGTON SERIES

Over 55,000 acres of the soil mapped in Prince Edward County has limestone bedrock within one foot of the surface. The Farmington soils occur as broad level tablelands, broken by the occasional escarpment and rock ledge. Approaching the county, via Highway No. 14, one climbs an escarpment at Mountain View, which continues for fifteen miles, through Victoria Church, Ameliasburg, Crofton and Demorestville in the township of Ameliasburgh and Sophiasburgh. Near Rednersville another broad tableland presents a bold escarpment towards the Bay of Quinte. Extensive areas of Farmington soils also occur in North and South Marysburgh townships as well as in the township of Athol. Lake on the Mountain is located on a limestone plain east of the town of Picton in North Marysburgh township.

Farmington Loam (48,600 acres)

The Farmington loam is a shallow soil derived from a thin layer of drift and some limestone weathered in situ. The profile is less than one foot in

depth and often the soil horizons are only weakly differentiated. The following profile was examined in a wooded area.



2-3 inches dark brown loam; pH 7.6; limestone fragments in the surface soil; underlain by 2-6 inches grey brown stony loam grading into 1-2 inches of dark brown clay loam over limestone bedrock.

The topography is level to slightly undulating.

The soil dries out rapidly and becomes quite droughty in periods of low rainfall. For the most part the drainage of the Farmington Loam might be considered excessive.

Red cedar, white cedar, juniper, mullein and blueweed are most commonly found on the Farmington.

Agriculture

Only a very small proportion of the Farmington loam is cultivated, the remainder serving a useful purpose as pasture land. Very fine stands of Canada blue grass are produced on this soil. There appears to be a tendency to acquire large holdings of these shallow soils for pasture purposes. In the South Bay peninsula large tracts are used for grazing land which has resulted in a high incidence of abandonment of farm buildings. In some instances small, deeper pockets can be tilled to advantage in conjunction with the shallow pasture land.

Prince Edward County offers many attractions to those seeking recreation and thousands have already enjoyed the generous hospitality extended to visitors. Along the shores of the Salmon Point Peninsula, the South Bay Peninsula and several other locations within the County, the development of these shallow soils as recreational land offers profitable opportunity.

Juniper and red cedar occur in fairly large quantities on the shallow soils underlain by limestone bedrock.

Farmington Loam, Imperfectly Drained (6,500 acres)

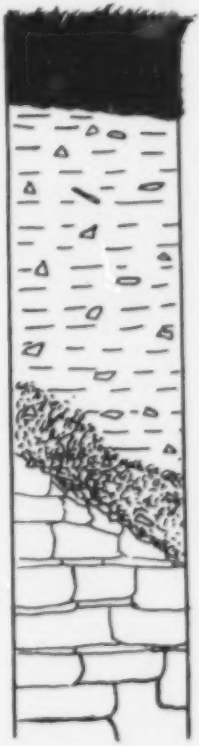
The imperfectly drained Farmington differs from the well drained type, in that it occurs in slightly depressional areas, is mottled beneath the surface layer and is less droughty. The organic matter content of the surface layer is higher than the well drained type. A fairly large proportion of this soil remains in tree cover which contains a large percentage of white cedar. It is used largely for grazing purposes and growing trees.

AMELIASBURG SERIES

Materials derived from the weathering of the underlying bedrock together with deposits of morainic, marine and outwash origin form the basis from which the soils in the Ameliasburg series are derived. Ranging in depth from one to three feet, the soils in this series are considered moderately shallow.

Ameliasburg Clay Loam (25,200 acres)

Stony, clay loam overlying limestone bedrock and fair to good drainage characterize this type. It is found fairly well distributed over the entire County, the greatest expanse being located in the southern section of Sophiasburg and Ameliasburg Townships. A cultivated profile exhibits the following characteristics:



A_c—4-6 inches grey brown clay loam; limestone fragments frequent in the surface soil; organic matter medium to low; crumb structure: pH 8.0.

A_z—12-15 inches grey brown clay loam; granular structure; pH 8.0.

B —4-6 inches heavy brown clay loam; small nuciform structure; pH 8.2.

C —Shallow layer of heavy limestone till or bedrock; pH 8.2.

The Ameliasburg clay loam has level to slightly undulating topography. Depressional areas too small to be shown on an inch to the mile scale of map are included. There is little evidence of erosion except where stream courses have scoured the soil covering off the underlying bedrock. Internal drainage is rather slow because of the high clay content. The external drainage is good.

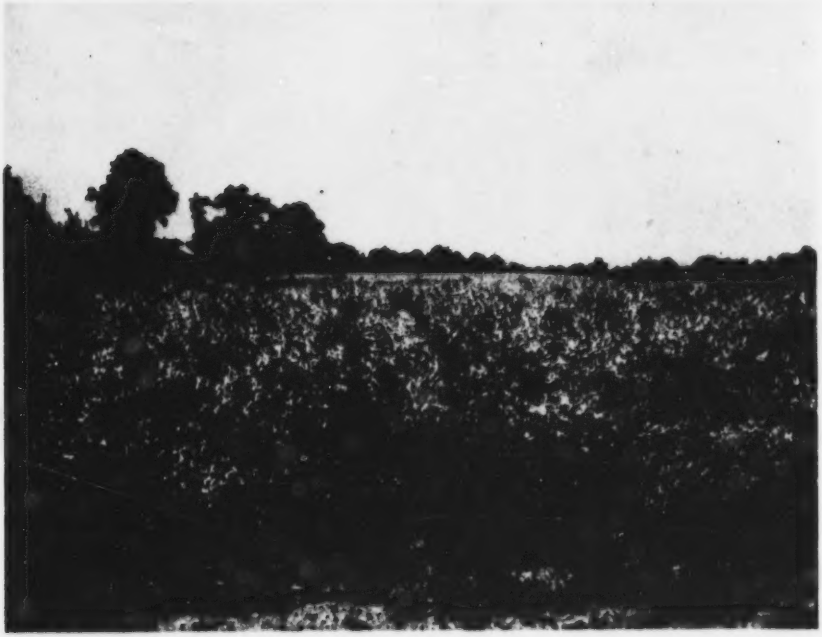
Although very little of this type remains in woodland at the present time, there is evidence to indicate that it was developed under a hardwood cover. Elm, maple and ironwood were the most common trees noted.

Agriculture

In spite of its shallowness, the Ameliasburg clay loam grows a wide range of crops. Dairy farming is carried on extensively and large acreages are utilized for growing canning crops.

The agricultural potentialities are limited materially by the shallowness of the soil. Hay and pasture crops appear to do very well, and with an average amount of rainfall, fair crops of small grains are produced. The soil appears to be well adapted to the growing of alfalfa.

Depending on climatic conditions, fair yields of tomatoes and corn are obtained on this type. In dry seasons the response obtained on these soils from artificial fertilizers is disappointing. Liberal applications of barnyard manure are required to maintain the organic matter level and assist in conserving soil moisture. In wet seasons it is difficult to establish a favourable physical condition in the soil because of its tendency to puddle and bake. In dry seasons, the imperviousness of the clay materials, combined with shallowness to bedrock, make it a droughty soil.



The moderately shallow limestone soils produce good crops of legumes. This sweet clover growing on Ameliasburg clay loam, if properly fertilized, will serve as a soil-building crop.

Ameliasburg Clay Loam—Imperfectly Drained (5,000 acres)

The Ameliasburg clay loam imperfectly drained, occurs for the most part in Sophiasburg Township. Because of the level to undulating topography, the external and internal drainage are imperfect. Bedrock occurs at depths similar to that in the Ameliasburg clay loam and there is a small proportion of granite boulders on the surface. Most of the imperfectly drained Ameliasburg has been cleared and is used as grazing land. It would appear that the tree

cover consisted of elm and sugar maple. Shallowness to bedrock and unsatisfactory moisture relationships limit the usefulness of these soils for orchard purposes. The extreme stoniness of the surface soil makes it difficult to cultivate.

Ameliasburg Loam (25,600 acres)

The Ameliasburg loam is fairly well distributed over the entire county. With the exception of the textural difference, the characteristics of the moderately shallow clay loam apply as well to this type. In general, the fertility level of the loam is lower than that of the heavier clay loam.

The topography varies from undulating to slightly rolling.

Both the external and internal drainage of this type can be described as good. Because of the lower clay content and lower organic matter content of the loam, there is a tendency for it to suffer from summer drought more readily than the clay. This is partly compensated for by the lighter texture and friable consistency of the loam making it respond readily to light summer rains. Where row crops are grown extensively, some sheet erosion occurs.

Red cedar, maple and elm are the dominant trees in the woodlots. Considerable woodland still remains on this type.

Agriculture

The utilization of the loam is similar to that of the clay loam. Larger acreages are in pasture and a few more orchards are located on this type. The fertility level is lower than that of the clay loam and the maintenance of organic matter on the lighter textured soil is more of a problem. Excessive stoniness makes cultivation difficult. However, provided climatic conditions are suitable, the capability of this type to produce fair yields of a wide range of crops makes it a fairly valuable and important soil in the County.

Athol Sandy Loam (2,700 acres)

The Athol sandy loam is developed on stony sandy material of varying depths (usually one to three feet) over limestone bedrock. It occurs in the Milford area of South Marysburg Township, the Sand Banks area of Hallowell Township with a small tract near Cressy Wharf in North Marysburg Township. The profile varies according to the type of sandy material overlying the bedrock.

The topography ranges from smooth to gently undulating, being influenced by the underlying bedrock. Erosion has not effected this type noticeably.

The drainage is variable usually being either excessive or imperfect. Where depressions occur in the rock, the water table is held up and imperfect drainage results. In the coarse materials, where there is a shallow deposit over bedrock, the Athol sandy loam has a tendency to be droughty. Frequently, the imperfect drainage only lasts for part of the season, the soil becoming droughty in periods of low rainfall.

Most of the Athol sandy loam has been cleared. It would appear that maple, oak and choke cherry were the most frequently occurring trees found on this type.

Agriculture

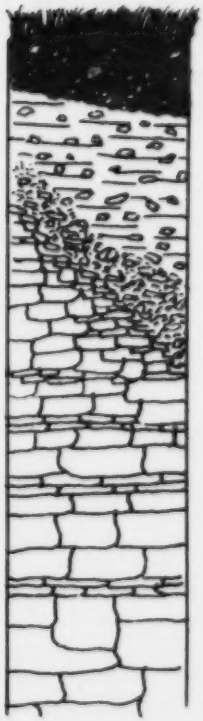
The inherent natural fertility of the Athol sandy loam is low and, consequently, liberal applications of manure should be made. Depth to bedrock and low fertility are the chief limiting factors in the production of farm crops.

In the Sand Banks area of Hallowell Township fair crops of tomatoes and corn are produced on this type. Some orchards are found on this soil and provided adequate fertility levels are maintained, fair success is attained. On the shallow coarse sandy areas it is difficult to grow satisfactory crops of anything because of low fertility, excessive drainage and droughtiness.

Hillier Clay Loam (25,600 acres)

The Hillier clay loam is characterized by a very stony surface soil, reddish brown colour and rolling topography. It differs from the Ameliasburg series in the very large number of limestone fragments found in the surface soil. These may be accounted for by thin beds of Trenton limestone with numerous partings of dark brown shale. The higher shale content is reflected in the heavy texture of the clay intermixed with the more resistant limestone. The soil is highly calcareous and covers a large portion of Hillier Township, as well as a broad area in Hallowell Township in the Bloomfield-Wellington area.

A profile common to the Hillier clay loam can be described as follows:

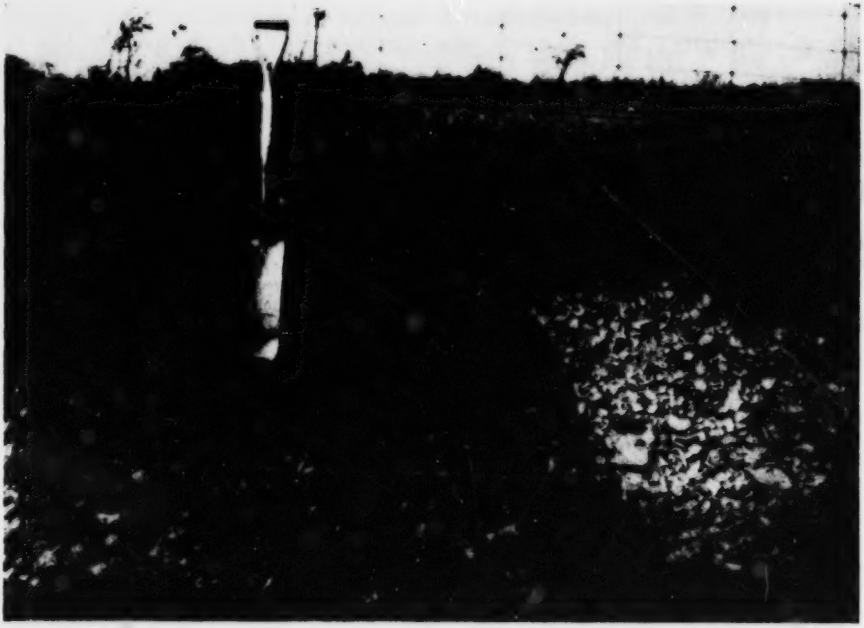


A_1—4-6 inches reddish brown clay loam; numerous limestone fragments ranging in size from ½ to 1½ inches; organic matter medium; crumb structure; pH 7.6.

A_2—10-18 inches reddish brown clay loam; granular structure; frequent fragments; pH 7.4.

B —4-6 inches heavy brown clay loam; medium nuciform structure; frequent fragments; pH 7.6.

C —Friable limestone bedrock interbedded with shale partings; pH 8.2.



This profile developed on shaley limestone bedrock is moderately shallow. The B horizon is found at the juncture of the weathered material and the underlying bedrock.

The topography of the Hilbier clay loam ranges from slightly undulating to strongly rolling. Rolling areas that have been in row crops have suffered from sheet erosion.

The presence of many rock fragments throughout the profile permits adequate internal drainage while the topographic features assure satisfactory external drainage.

The tree cover consists of elm, maple and beech.

Agriculture

Due to the presence of a large proportion of limestone fragments this soil is referred to locally as "clay gravel." It is well suited to dairy farming and grows alfalfa, clovers, small grains and canning crops satisfactorily, provided an adequate organic matter content is maintained.

The presence of shale partings in the underlying bedrock permits greater root penetration than in the Ameliasburg series with the result that tree fruits are grown with fair success. A mulch system for tree fruits appears to to be very effective on the "clay gravel" and this could well be accepted as a general practice. In the Bloomfield area some growers mulch the trees heavily with straw in the fall of the year, thus conserving the maximum amount of moisture and at the same time building up the organic matter content.

The greatest limitation of this soil for crop production is its tendency to become droughty. The excessive stoniness inhibits early cultivation but in spite of this, many profitable farm businesses are maintained on the Hillier clay loam.

Canning crops are grown fairly extensively on the Hillier clay loam. Note the large number of limestone rubbles in the surface soil.

Gerow Clay Loam (11,600 acres)

Occurring for the most part in depressional areas, the Gerow clay loam is the poorly drained member of the Hillier and Ameliasburg catenas. Mottlings frequently occur beneath the surface soil and the profile exhibits the characteristics of the Dark Grey Gleisolic Great Soil Group. The following is a description of a commonly occurring profile.

A_e—6-8 inches dark brown clay loam; crumb structure; stony; friable consistency; pH 7.5.

G --Grey mottled clay with occasional limestone fragments; massive structure; plastic consistency; pH 7.6.

Limestone bedrock.

The topography ranges from slightly undulating to depressional.

Both the internal and external drainage are poor.

Fairly extensive areas of the Gerow clay loam remain in woodland. Elm and soft maple are the trees most frequently occurring in the woodlots.

Agriculture

Fair crops of hay and pasture are produced on this soil type. However its usefulness is limited by unsatisfactory natural drainage. Buckwheat does fairly well but it is usually too wet in the spring to plant other small grains. It is not well suited to tree fruits or canning crops.

The organic matter content is medium to high. Artificial drainage would be difficult due to the closeness of the bedrock and it is doubtful if the increased yield in crop production would warrant the cost of installing tile drains.

G. MISCELLANEOUS SOILS

Eastport Sand (1,400 acres)

The Eastport sand mapped in Prince Edward County occurs as rolling to hilly sandy ridges and includes what is locally known as the "Sand Banks." An immense sand bar almost 5 miles in length separates West Lake from Lake Ontario. This bar which begins at the Sand Banks with a width of half a mile tapers to 100 feet at the village of Wellington. A couple of miles to the southeast, Spence, or East Lake, is separated from Lake Ontario by a shorter sand bar. The Picton eskér mentioned previously ends between the two lakes and the sand for the two bars appears to have been derived from these glacial deposits and reworked by lake waters and wind.

The Eastport sand is derived from coarse grey sands and fine gravel. The profile exhibits very little horizon differentiation. Where a scanty vegetative cover has been established, there is usually a thin grey surface layer underlain by coarse yellowish brown sand which fades into grey sands and fine gravel at depths of 24 inches and greater. The profile is stone-free and is sometimes calcareous throughout. Occasionally the Eastport exhibits sorting, reflecting the influence of the different wind velocities that deposited the materials. For the most part this soil occurs as sand dunes which have been severely wind eroded, and are of practically no agricultural value. Often they are nearly bare of vegetative cover. The Ontario Department of Lands and Forests has reforested some of these areas with pine and poplar and have experienced a fair measure of success in stabilizing the dunes.

Scores of tourists are attracted to Prince Edward County to visit the "Sand Banks" which provide excellent beaches for recreational purposes.

Marsh (13,300 acres)

Large tracts of marsh occur in the low lying and swampy positions in the Muscote Bay area, and again in the Big Island area. The water is held on the surface of the soil by a compact subsoil or bedrock. Much of the marsh land is on a similar level to the Bay of Quinte. Usually the surface soil consists of

6-10 inches of semi-decomposed organic matter mixed with mineral matter. Most of these areas are covered with a ground vegetation of sedges, cattails, rushes and a few trees, mostly cedar and elm.

The agricultural potentialities of the marsh land are practically nil. It is used for recreational purposes such as trapping and duck shooting and in this serves a useful purpose. Muskrat trapping is carried on fairly extensively in the marsh land and the income derived from this industry is considerable.

Muck (13,100 acres)

The muck is usually shallow varying in depth from 1 to 3 feet and underlain by mottled clay, silt or bedrock. The Big Swamp, located in the central part of the county, is the largest single expanse of muck mapped. Other areas are widely scattered over the area surveyed.

Organic layer consisting of semi-decomposed vegetative material, varying in depth from one to three feet; usually neutral to alkaline on the surface.

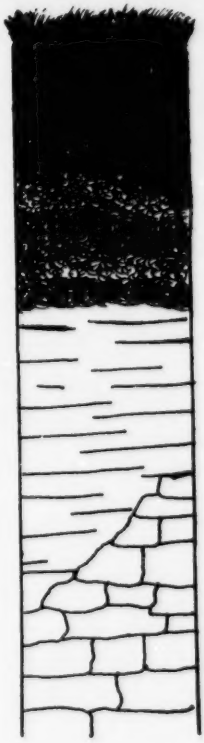
Clay

Rock

Practically no agricultural development has taken place on the muck soils. For the most part it remains wooded with elm, cedar and ironwood, thus serving a useful purpose under present conditions. To grow crops on the muck soils would necessitate clearing and drainage and it is very doubtful if the returns would warrant the expenditure involved for development.

Bottom Land (950 acres)

Very little Bottom Land was mapped in the county. Bottom Land is mapped along stream courses in areas subject to frequent flooding. Since the streams that occur in this area are small there has been very little recent alluvial material deposited. Characterized by deep organic layers, and a high water table it occupies a small acreage.

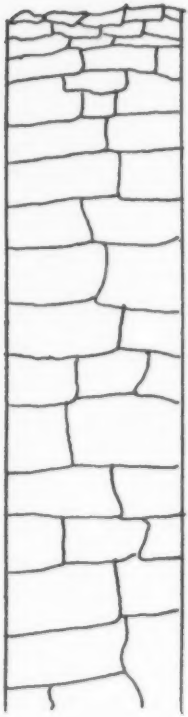


Land lying along stream courses and subject to flooding. Usually a deep layer of dark materials, high in organic matter, washed in by streams and deposited over clay, till, or bedrock.

Usually it is used for pasture or left in woodland adjoining the streams.

Rock (2,500 acres)

Areas mapped as rock are found along the face of, or in close association with the escarpments. The rock outcrop is of practically no agricultural value. The most common vegetative cover is red cedar and sumachs. Usually found included with pasture land their capability for this purpose is very limited.



Areas mapped as rock have little or no soil covering over the bedrock. Usually occur as steep, bold escarpments.

PART IV

AGRICULTURE AND LAND USE

EARLY SETTLEMENT AND AGRICULTURAL DEVELOPMENT

Settlement began in Prince Edward County during the latter part of the eighteenth century. The Township of Hallowell was entered in 1770, and immediately after the American Revolution, the other townships rapidly filled until in 1808 the last township (South Marysburgh) was entered. The Report of the Agricultural Commission of 1881 reports as follows with reference to Prince Edward County, "The County is now reported wholly settled, the process having occupied about forty-six years."

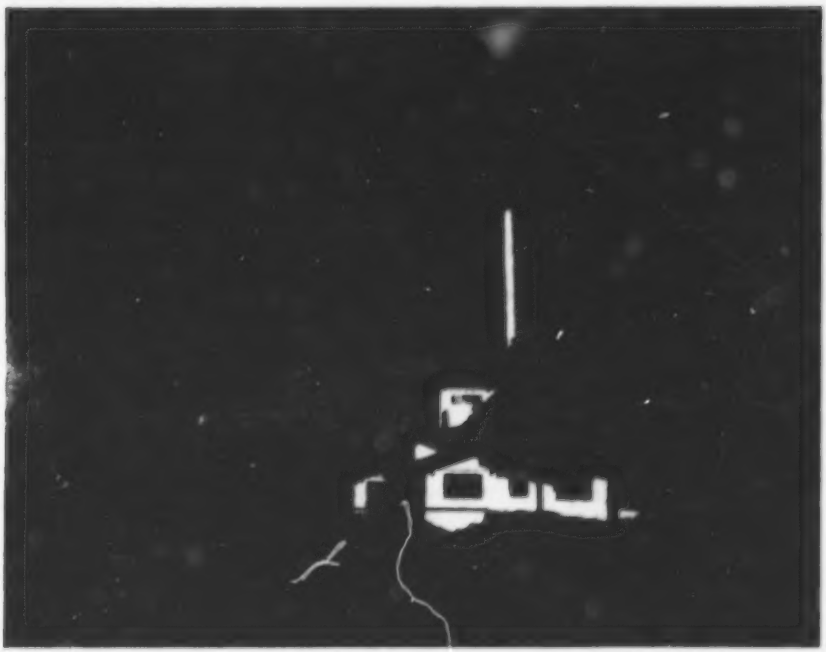
Many of the United Empire Loyalists settled in Prince Edward County when they fled from the newly born United States. They brought only the barest necessities of life with them. The land was cleared with the aid of oxen and broken with the crudest hand-wrought plows. Early threshing was done with the flail. Gradually, as more land was cleared, the necessity for improved and more efficient machinery increased. The horse superseded the oxen, the plow was improved and the disc harrow and disc drill were introduced. Around 1868 the mowing machine came into use and a little later the reaper.

The agricultural progress of the area may well be divided into four eras. Following the early days when the farmer was attempting to clear his land and acquire a living, came the generation of the barley and hop trade. Large quantities of these products found their way to the United States and even overseas markets. The barley trade brought with it the building and operation of a large number of mills throughout the County. From 1860 to 1880, much barley was grown for the export trade and formed the principal source of income for the farmers. This condition continued until the introduction of high tariffs that prohibited the export of grain. At the present time, only a small acreage of barley is grown in Prince Edward County. Contemporary with the barley days, hops were grown in Sophiasburg and Hallowell Townships. They were also grown for export to United States and overseas to be used for the manufacture of beer. However, the era of hop growing, like that of the malting barley, closed with the introduction of the tariffs.

Preceding the era of canning factory produce and following the barley and hop days, the growing of seed peas was a leading one in the County. For many years, Prince Edward County grew a large acreage of seed to meet the demands for the green pea markets of the United States.

The cheese industry had an early beginning in the County. As early as 1867, factories were erected at Cherry Valley and Bloomfield. The early settlers had a keen interest and pride in the dairy industry and some of the early foundation stock of the Holstein breed originated in this area. The breeding of the Holstein and the raising of the standards of all dairy cattle has had much to do with the place Prince Edward County occupies in the dairy industry.

The first fruit and vegetable canning factory in Eastern Canada was established in Prince Edward County in 1881. During the interval since 1881, the canning industry has expanded and developed greatly until it is now one of the most important in the County.



The processing of milk is an important industry. This plant located on Highway No. 33 serves a large area.

The growing of tree fruits had an early beginning and many awards have come to this County for the production of prize apples.
(NOTE: Much of the information relating to the early agricultural development of the County was obtained from "Picton's 100 Years" published by authority of the Centennial Committee in 1937 when Picton celebrated its Centennial.)

Present Agriculture and Land Use

The agriculture of Prince Edward County at the present time consists largely of dairy farming, production of canning crops and orcharding. In 1943 thirteen cheese factories operated in the County, when 3½ million pounds of cheese were produced. For the most part, the soils of the area are well adapted to the growing of alfalfa, clover and small grains which has contributed to the establishment of a high proportion of dairy farming. Practically all the hay and grain produced in the County is fed to livestock which is desirable in that it provides considerable quantities of organic materials in the form of barnyard manure.

Along with dairy farming, most farmers produce canning crops. From the beginning, the canning industry in Prince Edward County has been a very important source of income to the farmers. In 1943, thirty-four factories operated, providing an income of $750,000 to the growers of this area.

Some fine herds of Holstein cattle are found in Prince Edward County. Large quantities of barnyard manure are produced and used to good advantage in maintaining soil organic matter levels.

Extensive winter killing occurred in many of the orchards of the County in 1933-34, when very low temperatures occurred. Some re-planting has been done but not as extensively as in the counties of Northumberland and Durham. However, in 1943, the area produced 35,000 barrels of apples. Excellent facilities for storage and marketing are furnished by the cold storage plant in the town of Picton.

In addition to the above agricultural endeavours, poultry raising is an important source of income for the farmers. Several large flocks are maintained and the amount of poultry products being produced in Prince Edward County is increasing.

The cold storage plant at Picton offers facilities to the farmers of the County for storage and marketing of poultry products.

The utilization of the land in Prince Edward County is shown in the following tables taken from the 1941 Census:

TABLE 5

UTILIZATION OF LAND IN PRINCE EDWARD COUNTY

	Acres
Total land area	249,600
Area of occupied farms	230,025
Percent of total land area occupied	92.4
Improved Land	159,111
Pasture	35,529
Fallow	4,671
Field crops	98,665
Market garden	9,329
Orchard	2,537
Small fruits	275
Unimproved land	70,914
Woodland	26,057
Natural pasture	36,966
Marsh or waste land	7,891

TABLE 6

OCCUPIED LAND ACCORDING TO TOWNSHIP (1941 CENSUS)

IMPROVED LAND

Township	Field Crop	Fallow	Pasture	Market Garden	Orchard & Vineyard	Small Fruits Nursery	Other	Total
Ameliasburg	19,348	510	7,572	1,002	564	66	1,324	30,386
Athol	8,980	401	2,732	919	193	18	746	13,989
Hallowell	19,536	681	7,143	2,881	462	78	1,577	32,358
Hillier	15,751	1,031	4,752	2,070	181	59	1,417	25,261
Marysburg N.	9,564	855	3,746	561	732	25	688	16,171
Marysburg S.	7,578	286	3,403	436	359	9	598	12,669
Sophiasburg	17,908	907	6,181	1,460	46	20	1,755	28,277
Total for County	98,665	4,671	35,529	9,329	2,537	275	8,105	159,111

UNIMPROVED LAND

Township	Woodland	Natural Pasture	Marsh or Wasteland	Total
Ameliasburg	4,884	6,554	1,798	13,236
Athol	2,222	6,370	229	8,821
Hallowell	4,043	3,805	1,573	9,421
Hillier	3,396	2,563	1,335	7,294
Marysburg N.	2,358	3,162	1,930	7,450
Marysburg S.	3,210	7,472	245	10,927
Sophiasburg	5,944	7,040	781	15,765
Total for County	26,057	36,966	7,891	70,914

TABLE 7

ACREAGE OF DIFFERENT CROPS ACCORDING TO TOWNSHIP (1941 CENSUS)

Township	Wheat	Barley	Oats	Rye	Flax	Mixed or Other Grains	Hay Cultivated	Other Fodder Crops	Potatoes	Other Roots	Total
Ameliasburg	799	250	5,959	587	....	2,015	8,747	667	234	39	19,297
Athol	328	447	2,533	568	....	1,006	3,769	227	107	6	8,991
Hallowell	645	766	5,876	471	....	2,584	8,064	842	278	22	19,548
Hillier	892	955	5,369	510	13	1,424	6,087	335	133	23	15,741
Marysburg N.	518	285	2,410	568	....	832	4,645	197	95	....	9,550
Marysburg S.	173	324	1,945	781	4	872	3,277	133	67	1	7,577
Sophiasburg	581	467	5,110	838	11	1,322	8,833	595	126	14	17,897
Total for County	3,936	3,494	29,202	4,323	28	10,055	43,422	2,996	1,040	105	98,601

Table (7) indicates that cultivated hay, oats, wheat and barley are the field crops most commonly grown. According to Table (6) market garden crops (tomatoes, peas and corn) occupy a fairly extensive acreage. The acreage of market garden crops is relatively small in South Marysburg and Athol Townships where shallow soils predominate. The greatest concentration of orchards is found in the Waupoos peninsula of North Marysburg Township, Ameliasburg and Hallowell Townships.

Crop Adaptability Ratings and Land Use Management

The soils of Prince Edward County produce a wide range of crops. In addition to such general farm crops as oats, barley, alfalfa, timothy, hay and pastures, large acreages are devoted to the production of peas, tomatoes, corn and tree fruits. Provided the climatic environment is suitable, the degree of success of production of these crops will vary according to the suitability of the soil on which they are grown. Already in this report the potentialities and limitations of the soil types for crop production have been discussed. Attention is now directed towards the soil type-plant relationship with special consideration of the comparative adaptability of individual soil types for selected crops.

The adaptability of a soil to produce a crop is influenced by both its chemical and physical features. Such external features as topography, erodability, stoniness, etc. are evaluated, as well as internal features, such as organic matter content, texture, structure, reserve supply of nutrients and water, together with factors affecting their availability.

In making the adaptability ratings, the characteristics of the soil in its present conditions are considered in relation to their effect upon the production of a certain crop. The ratings do not carry an implication of mathematical precision. They are made for crops commonly grown in the area under prevailing systems of management. The productivity also varies with management which includes all those operations and materials that go into producing a crop. With the introduction of new varieties, new systems of soil management and other unforeseen factors, the ratings of necessity may be adjusted and changed. The ratings are based on observations made during the survey, by data and opinions furnished by agronomic and soil workers familiar with the area and by consultation with local farmers and others. On the basis of the adaptability of the soils of Prince Edward County to produce crops under prevailing systems of management and environmental conditions, the soils have been placed into five groups and rated for five general and four specialized farm crops commonly grown in the area.

GROUP I—GOOD CROP LAND

Soil Type	Acreage
South Bay clay loam	4,800
Darlington loam	13,300
Elmbrook clay loam	14,500
Percy fine sandy loam	4,000
South Bay clay	3,400
Waupoos clay	6,000
Elmbrook clay	4,600
Total	50,600

Under a system of management that will provide an adequate organic matter content and maintain satisfactory nutrient levels, the soil contained in Group I will produce moderate to high yields of general farm crops. Due to the high clay content of the heavy textured soils, (South Bay, Elmbrook and Waupoos), careful management is necessary to establish a satisfactory physical condition in them. The organic matter content of the Darlington loam and Percy fine sandy loam is medium and medium to high in the remainder of the group. With the exception of the Percy fine sandy loam, the soils of this group are well supplied with available plant nutrients.

Imperfect drainage limits the usefulness of the Elmbrook types for the production of alfalfa. The clay soils are less well suited to the production of canning crops and tree fruit than are the clay loams, loams and fine sandy loam types.

Both general and specialized crops grow well on the Percy fine sandy loam, provided manure and fertilizer are used to take care of the low fertility levels that commonly occur in this soil type.

The growing of canning crops and tree fruits requires special soil management practices commonly used for the production of these crops.

TABLE 8

***CROP ADAPTABILITY RATINGS FOR GOOD CROP LAND**

Soil Type	Oats	Barley	Alfalfa	Timothy	Hay & pasture	Peas	Tomatoes	Corn	Tree Fruits
South Bay clay loam	G	G	G	G	G	G	G	G-F	G-F
Darlington loam	G	G	G	G	G	G	G	G	G-F
Elmbrook clay loam	G	G	F	G	G	G	G	G-F	F-P
Percy fine sandy loam	G	G	G-F	G-F	G-F	G	G	G	G-F
South Bay clay	G	G	G	G	G	G-F	G	G-F	F-P
Waupoos clay	G	G	G	G	G	G-F	G	G-F	F
Elmbrook clay	G	G	F	G	G	G-F	G	G-F	F-P

*The crop adaptability rating for each soil type as follows:

G—Good; G-F—Good to Fair; F—Fair, F-P—Fair to Poor; P—Poor.

GROUP II—GOOD TO FAIR CROP LAND

Soil Type	Acreage	Limitations
Hillier Clay loam	25,600	Shallowness
Pontypool sandy loam	3,000	Fertility & Erosion
Total	28,600	

The soils contained in Group II are moderately to well suited to the production of general farm crops Dairy farming and the growing of canning crops and tree fruits are the chief agricultural endeavours found on the Hillier clay loam and the Pontypool sandy loam.

Although the presence of a large proportion of limestone fragments interferes with cultivation, it tends to lessen puddling and baking in the Hillier clay loam. This soil is fairly well supplied with organic matter and plant

nutrients. The greatest limitation to crop production is the shallowness over the underlying bedrock. This condition is aggravated by a fairly low precipitation particularly in July and August. Although the shallowness of the soil cannot be remedied, maximum moisture retention can be attained by maintaining an adequate level of soil organic matter. Since the Hillier clay loam is well adapted to the growing of alfalfa and clovers, and dairy farming is carried on extensively, the maintenance of organic matter is not too difficult.

Many orchards are located on this type and for soil moisture conservation the use of a sod mulch cultural system is proving quite effective. Several orchardists are using a sod mulch system at the present time and encouraging results bespeak the merits of the system.

The organic matter content and nutrient level of the Pontypool sandy loam is not as high as in the Hillier clay loam. To serve its most useful purpose, a soil management system must be employed whereby adequate organic matter and nutrient levels are maintained. Because of its rolling topography, the Pontypool sandy loam is susceptible to sheet erosion, especially when used for row crops or for tree fruits under clean cultivation. The use of sod mulch in orchards helps greatly in reducing the hazards of sheet erosion. The degree to which sheet erosion has affected the area has not reached the state where intensive conservation measures are required for its control. However, the menace exists and land owners are advised to protect the valuable topsoil through the use of one or more of the following practices: (1) incorporation of legumes in the grass seed mixture, (2) maintenance of fertility and of an adequate supply of organic matter, (3) maintenance of grass cover in natural drainage areas to prevent gully erosion.

TABLE 9

*CROP ADAPTABILITY RATINGS FOR GOOD TO FAIR CROP LAND

Soil Type	Oats	Barley	Alfalfa	Timothy	Hay and Pasture	Peas	Tomatoes	Corn	Tree Fruits
Hillier clay loam	G-F	G-F	G	G-F	G	G-F	G-F	G-F	F
Pontypool sandy loam	F	F	G-F	G-F	G-F	G	G	G	G-F

*The crop adaptability rating for each soil type as follows:

G—Good; G-F—Good to Fair; F—Fair; F-P—Fair to Poor; P—Poor.

GROUP III—FAIR CROP LAND

Soil Type	Acreage	Limitations
Ameliasburg loam	25,200	Shallowness
Ameliasburg clay loam	25,600	Shallowness
Solmesville clay loam	1,300	Drainage
Gerow clay loam	11,600	Shallowness & Drainage
Tecumseth sandy loam	4,200	Drainage and Fertility
Brighton sandy loam	5,000	Fertility
Brighton gravelly sand	1,100	Fertility
Total	74,000	

The soils contained in Group III occupy about 31% of the surveyed area. Their adaptability to produce general farm crops is limited by one or more of the following hazards (1) shallowness over limestone bedrock, (2) imperfect drainage, (3) low fertility, and (4) susceptibility to erosion.

The Ameliasburg series has less than three feet of soil underlain by limestone bedrock, and often suffers extensively from unsatisfactory moisture relationships during the summer season. However, with good soil management practices, the Ameliasburg soils are capable of producing fair yields of hay, grain and canning crops. To conserve these soils so that they will sustain their present use capability, the fertility levels must be maintained with particular emphasis being placed on the importance of an adequate organic matter content. Response to fertilizer applications is strongly influenced by seasonal conditions and is disappointing in seasons of low precipitation.

The use capability of both the Gerow and Solmesville series is limited by poor drainage. Cereal grains do fairly well on these types and they produce satisfactory crops of hay and pasture. Although the Tecumseth sandy loam is imperfectly drained, it favours a wider variety of crops than the poorly drained heavy soils and should respond to tile drainage. Crop production on Tecumseth soils is limited by low fertility levels as well as unsatisfactory moisture relationships.

TABLE 10

*CROP ADAPTABILITY RATINGS FOR FAIR CROP LAND

Soil Type	Oats	Barley	Alfalfa	Timothy	Hay and Pasture	Peas	Tomatoes	Corn	Tree Fruits
Ameliasburg loam	F	F	G-F	F	F	F	G-F	F	F
Ameliasburg clay loam	F	F	G-F	G	G	F	G-F	F-P	F-P
Solmesville clay loam	F	F	F-P	G-F	G-F	F-P	F	F-P	P
Gerow clay loam	F	F	P	F	G-F	F-P	F-P	F-P	P
Tecumseth sandy loam	F-P	F-P	F-P	F	F	F	F	F	F
Brighton sandy loam	F-P	F-P	F-P	F	F	F	F	F	F
Brighton gravelly loam	F-P	F-P	F-P	F	F	F	F	F	F-P

*The crop adaptability rating for each soil type as follows:

G—Good; G-F—Good to Fair; F—Fair; F-P—Fair to Poor; P—Poor.

GROUP IV—FAIR TO POOR CROP LAND

Soil Type	Acreage	Limitations
Pontypool sand	1,400	Fertility and Wind Erosion
Athol sandy loam	2,700	Shallowness and fertility
Granby sandy loam	850	Drainage
Ameliasburg clay loam (imperfectly drained)	5,000	Shallowness and drainage
Farmington loam	48,600	Shallowness
Farmington loam (imperfectly drained)	6,500	Shallowness and drainage
Bottom Land	950	Subject to flooding
Muck	13,100	Drainage
Total	79,100	

The soils in Group IV are moderately to poorly suited for the production of general farm crops. Shallowness over bedrock and poor drainage often make the Ameliasburg and Farmington better suited for grazing land. They support fair stands of pasture, particularly Canada Blue, and serve a useful purpose in providing grazing land for the dairy herds. The Ameliasburg and Farmington have suffered very little from erosion hazards except where the occasional stream course has scoured the soil from the underlying bedrock.

Low fertility and susceptibility to erosion influence the capabilities of the Pontypool sand and Athol sandy loam. Coarse texture and lack of cohesion between the particles make these soils susceptible to wind erosion. Often the vegetative cover produced has not been sufficiently dense to hold them in place.

The greatest limitation for successful crop production on the Granby sandy loam is poor drainage. Under present land use, most of the muck in Prince Edward County is in woodland. The muck is usually underlain by bedrock at fairly shallow depths and is poorly drained. Drainage improvement would be expensive and difficult and until such time as there is urgent need for more crop land, it is doubtful if the muck soils will be developed.

TABLE 11

*CROP ADAPTABILITY RATINGS FOR FAIR TO POOR CROP LAND

Soil Type	Oats	Barley	Alfalfa	Timothy	Hay and Pasture	Peas	Tomatoes	Corn	Tree Fruits
Pontypool sand	P	P	P	P	P	F-P	F-P	F-P	F-P
Athol sandy loam	P	P	P	P	P	F-P	F-P	P	P
Granby sandy loam	P	P	P	F-P	F	P	P	P	P
Ameliasburg clay loam imperfectly drained	P	P	P	P	F	P	P	P	P
Farmington loam	P	P	P	P	F	P	P	P	P
Bottom Land	P	P	P	P	F	P	P	P	P
Muck	P	P	P	P	P	P	P	P	P

*The Crop Adaptability rating for each Soil Type as follows:

G—Good; G-F—Good to Fair; F—Fair; F-P—Fair to Poor; P—Poor.

SUBMARGINAL CROP LAND

Miscellaneous Soils	Acreage
Marsh	13,300
Eastport	1,400
Rock Outcrop	2,500
Total	17,200

The Marsh land of Prince Edward County is flooded most of the time and is of practically no agricultural value. It does, however, attract many hunters and anglers to test their skill with the line and gun.

The shifting Eastport sand is of no value for the production of general farm crops. Frequently referred to as one of Nature's phenomena, "The Sand Banks" attract many tourists. The Ontario Forestry Department is attempting to reforest the Eastport sand to prevent wind erosion.

Little or no vegetation grows on the Rock Outcrop. Indeed, so thin is the soil covering on these areas that it would be difficult to reforest them. In many cases the outcrop bordering along the lakes and bays has a high potential value for recreational purposes.

Already the tourist trade has been developed extensively in Prince Edward County. Many farmers have erected resorts on their farm frontage adjoining the lakes and bays. This has proved to be a very remunerative enterprise when conducted along with the general farm programme. There is room for expansion and doubtless the rock outcrop would serve a very useful and worthwhile purpose as recreational land.

TABLE 12

*CROP ADAPTABILITY RATINGS FOR SUBMARGINAL CROP LAND

Soil Type	Oats	Barley	Alfalfa	Timothy	Hay and Pasture	Peas	Tomatoes	Corn	Tree Fruits
Marsh	P	P	P	P	P	P	P	P	P
Eastport	P	P	P	P	P	P	P	P	P
Rock	P	P	P	P	P	P	P	P	P

*The crop adaptability ratings for each soil type as follows:

G—Good; G-F—Good to Fair; F—Fair; F-P—Fair to Poor; P—Poor.

PART V

DISCUSSION OF ANALYTICAL DATA

The physical and chemical composition of surface soil samples from the major types is given in tables (14) and (15) of the appendix. Samples were procured from only the major soil types and where possible they were taken from permanent pasture fields. A brief discussion of the principle nutrients found in these soils follows.

Reaction

With the exception of the sandy soil types the soils of Prince Edward County are about neutral to alkaline in reaction. The Darlington, Ameliasburg, Farmington, Gerow and Hillier soils contain a fairly large proportion of Trenton limestone rock fragments which accounts for the alkaline reaction commonly found in these soils. The heavy textured soils, (Elmbrook, South Bay, and Waupoos) are developed on calcareous parent material, and the reaction of the surface soil usually ranges from slightly acid to neutral. Liming might be beneficial on the lighter textured soils depending on the crop to be grown.

Phosphorus

There are no figures available to indicate the total amount of phosphorus present in Prince Edward County soils. In table (13) and diagram (7) the levels of readily available phosphorus of the clays and clay loams of the surveyed area are compared with the phosphorus content of similarly textured soils in other areas of Ontario.

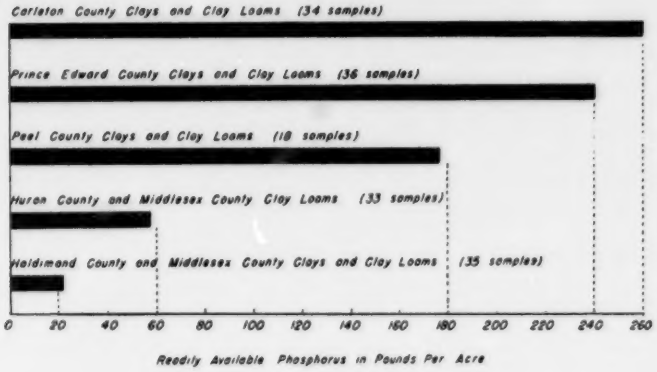
TABLE 13

COMPARATIVE LEVELS OF READILY AVAILABLE PHOSPHORUS IN HEAVY TEXTURED SURFACE SOILS OF PRINCE EDWARD, CARLETON, PEEL, HALDIMAND, HURON AND MIDDLESEX COUNTIES

	Reaction pH	Readily Soluble lbs. P/acre
Carleton County Clays and Clay Loams, Averaging 34 samples*	6.7	260
Prince Edward County Clays and Clay Loams, Averaging 36 samples†	6.9	240
Peel Clay and Clay Loams, Averaging 18 samples‡	6.9	176
Huron Clay Loam, Averaging 33 samples¶	7.3	57
Haldimand Clay and Clay Loam, Averaging 35 samples$	5.8	21

*Samples taken during Carleton County Survey 1940.
†Samples taken during Prince Edward County Survey 1943.
‡Samples taken during Peel County Survey 1941.
¶Samples taken during Huron and Middlesex County Surveys 1936.
$Samples taken during Haldimand and Middlesex Surveys 1935-36.

Figure 7. COMPARATIVE LEVELS OF AVAILABLE PHOSPHORUS IN HEAVY TEXTURED SURFACE SOILS


Carleton County Clays and Clay Loams (34 samples)
Prince Edward County Clays and Clay Loams (36 samples)
Peel County Clays and Clay Loams (18 samples)
Huron County and Middlesex County Clay Loams (33 samples)
Haldimand County and Middlesex County Clays and Clay Loams (35 samples)
0 20 40 60 80 100 120 140 160 180 200 220 240 260
Readily Available Phosphorus in Pounds Per Acre

These figures indicate that the heavy textured soils of Prince Edward County are well supplied with readily available phosphorus. In developing the method used in determining readily soluble phosphorus the authors, Lohse and Ruhnke, state that soils containing less than 60 pounds of phosphorus per acre appear to indicate very marked phospate deficiency. No figure had previously been suggested to indicate what might be considered as a sufficient amount for general farm crops. The results of analysis by this method, compared with those obtained by the Modified Thornton Method,* would indicate that 200 pounds per acre might be accepted as a tentative figure for soils which are not too strongly alkaline. If this figure were accepted it would appear that the heavier textured soils of the County are reasonably well supplied with phosphorus. However, it is well to keep in mind that the Hillier and Gerow clay loam are mildly alkaline, a fact, which might well alter the true picture. The lighter textured soils should respond to phosphatic fertilizers since the analyses show them to be well under the required 200 pounds per acre figure. It is of interest to note the relatively high amounts of readily available phosphorus contained in the Farmington soils. Because of their shallowness over bedrock these soils have been left under grass cover for long periods of time, the effect of which is reflected in the level of chemical nutrients.

The results of the chemical analyses would indicate that the Ameliasburg, Farmington, Hillier, South Bay, Elmbrook and Waupoos soils are well supplied with phosphorus. Phosphorus appears to be deficient in the Brighton, Darlington, Percy and Pontypool series. From Table (14) it will be noted that from some of the types only a few samples were taken and for this reason the results can only serve as a general indication.

*Ruhnke, Rivaz and Ewen—A Comparative Study of Rapid Chemical Tests and 'Neubauer Analyses' on some Typical Southern Ontario Soils. Scientific Agric. 19:4, 199-210, 1938.

Potassium

Approximately 167 pounds potassium (200 pounds K_2O) per acre plow depth is generally considered necessary for the production of general farm crops. For specialized crops such as canning crops and tree fruits, which are commonly grown in Prince Edward County, larger amounts are required. The results of the chemical analyses in Table (14) are a good indication of the amounts that are available to the growing crops. The level of potassium will vary according to soil management but for the purposes of comparison these figures may be considered as reasonably constant. According to the results of the analyses the heavy textured soils of the area are fairly well supplied with potassium while the lighter textured soils (Brighton, Darlington, Percy and Pontypool) are deficient.

Calcium and Magnesium

The elements calcium and magnesium are quite similar as regards their available forms, and the conditions which affect their availability. In both cases, the exchangeable form usually represents the great bulk of the readily available supply, and according to Truog in fertile loam soils that are not more than slightly acid this commonly amounts to 3,000 to 5,000 pounds per acre plow layer of calcium and about one-fourth to one-third as much magnesium. With the exception of the sand and sandy loam soil types the soils of Prince Edward County are well supplied with calcium. Since many of the soils contain fragments of the high calcium carbonate limestone bedrock it is not surprising that the calcium content is high. The Ameliasburg, Farmington, Gerow and Hillier soils contain the largest amounts, while the clays and clay loams are well supplied with calcium.

According to Table (14) the magnesium content of Prince Edward County soils is variable ranging from well over one thousand pounds per acre in the Elmbrook to less than 400 pounds per acre in the Brighton and Pontypool soils. With the exception of the Hillier clay loam the heavy textured soil types appear to be fairly well supplied with this element while many of the samples from the medium and light textured soil types contain 400 pounds per acre and less.

Organic Matter

The amounts of organic matter are lowest in the sands and sandy loams. For the most part the soils of the county are fairly well supplied with organic matter, a most important factor in an area of low precipitation and where shallowness over bedrock is an exceedingly important factor. In other parts of this report the necessity of organic matter maintenance has been emphasized and it is well to reiterate here its importance.

Base Exchange Capacity and Per Cent Base Saturation

The base exchange capacity and per cent base saturation of Prince Edward County soils are indicated in Table (15). The base exchange capacity is variable but in general is greatest on the imperfectly drained heavy textured Elmbrook clay and slightly less on the South Bay, Gerow, Hillier and Waupoos. The exchange capacity is least on the coarse textured Brighton and Pontypool soils.

The high calcium content of the medium and heavy textured soils of Prince Edward County results in wide calcium-potassium ratios. In many

of the soils free carbonates occur in the surface soils which may alter the per cent base saturation since the free calcium carbonate was not removed prior to determining the exchangeable bases. From table (15) the calcium-potassium ratios are wider on the till soils, (Darlington) and the shallow and moderately shallow soils over bedrock (Ameliasburg, Farmington, Gerow and Hillier) and the narrowest ratio occurs on the Brighton sand. In the lacustrine soils (South Bay, Elmbrook, and Waupoos) the ratios are variable within a type but not quite as wide as in those types that contain fragments of the underlying limestone bedrock. Considerable controversy prevails in the report of work conducted to determine the optimum calcium-potassium ratios for different crops. It is possible that on the calcareous soils of Prince Edward County crop response to applications of potassic fertilizers might be expected because of the very wide calcium-potassium ratios.

The calcium-magnesium ratios are fairly wide which may be accounted for by the high calcium carbonate content of the underlying Trenton limestone bedrock. Generally speaking those types of lacustrine origin (Elmbrook, South Bay, and Waupoos) have a narrower ratio than the till (Darlington) and shallow and moderately shallow types (Farmington, Ameliasburg, Gerow and Hillier). The analyses of Trenton limestone from a quarry in Sophiasburg Township show the calcium carbonate content to be 90.91% while the magnesium carbonate is only 1.20%. This wide calcium-magnesium ratio which exists in the underlying bedrock is reflected in those soil types which contain a large proportion of the underlying rock fragments.

The lacustrine soils are less influenced by the underlying bedrock. It is possible that the narrower calcium-magnesium ratio that exists on the members of the South Bay catena (South Bay and Elmbrook) is due to the chemical composition of the soil materials which were deposited at the time of the Gilbert Gulf invasion.

The results of analyses presented in Tables (14) and (15) indicate the wide variability that exists in Prince Edward County soils. They are included in the Soil Survey Report to be used as a guide in developing a fertility concept for the different soil types and should be interpreted in consideration of the crop to be grown.

APPENDIX

TABLE 14

CHEMICAL AND PHYSICAL COMPOSITION OF SAMPLES OF SURFACE SOIL FROM PRINCE EDWARD COUNTY, ONTARIO (a)

Type	Sample No.	Sand	Silt	Clay	Reaction pH Glass Electrode	%$CaCO_3$ (1)	Phosphorus Readily Soluble (2) lb. P/acre	Potassium Replaceable (3) lb. K/acre	Calcium Replaceable (4) lb. Ca/ac.	Magnesium Replaceable lb. Mg/ac. (5)	Organic Matter (6) %C x1.724
		Boutoucos Hydrometer									
		per cent 1.-.05mm	per cent .05-.002mm	per cent < .002mm							
Ameliasburg Clay Loam	4	18.8	35.8	46.2	7.58	1.50	356	340	14,688	632	4.88
	7	32.4	35.2	32.4	7.49	3.27	316	270	12,600	396	4.08
	32	28.2	33.0	38.8	6.06	.....	166	292	8,064	846	5.20
	55	19.4	35.8	44.8	7.53	10.25	316	330	15,504	340	4.76
Ameliasburg Clay Loam Imperfectly drained	25	44.4	34.0	21.6	6.83	.....	140	167	7,632	515	3.95
	28	47.0	28.0	25.0	7.14	7.03	172	230	8,064	972	4.03
	29	39.4	34.4	26.2	6.84	.....	168	260	11,616	671	7.14
Ameliasburg Loam	8	51.0	27.2	21.8	7.50	0.25	300	124	8,160	275	2.76
	9	42.0	32.6	25.4	7.47	0.35	240	197	11,520	445	4.90
	16	53.6	30.8	15.6	7.33	.....	176	118	7,824	296	4.64
Brighton Sand	37	88.5	7.7	3.8	5.63	.....	58	39	720	316	1.21
	39	89.3	7.1	3.6	5.90	.....	88	100	810	340	1.12
	45	83.9	13.7	2.4	5.29	.....	96	79	480	267	1.33
Brighton Sandy Loam	46	53.8	41.4	4.8	5.80	.....	60	61	1,560	364	3.46
Darlington Loam	26	48.0	30.0	22.0	6.18	.....	88	153	5,520	642	3.05
	31	28.4	42.2	29.4	6.47	.....	170	191	7,512	.....	4.85
	61	30.6	37.0	32.4	6.68	.....	312	206	7,056	394	3.98
Elmbrook Clay	3	25.8	41.6	32.6	7.25	5.11	360	310	19,344	1,457	9.53
	19	17.4	33.0	49.6	6.32	.....	194	476	17,304	1,368	8.69
	33	15.8	35.0	49.2	7.21	.....	184	385	12,624	1,677	5.72
	34	17.2	32.0	50.8	6.00	.....	200	394	6,264	1,875	4.77
	52	21.0	37.0	42.0	6.37	.....	146	300	6,336	1,346	3.56
	5	37.8	29.2	33.0	5.91	.....	104	159	5,088	1,021	2.91
	30	23.8	45.8	30.4	7.47	7.33	400	226	16,608	919	7.15

Farmington Loam	1	36.6	35.8	27.6	7.73	3.59	392	165	18,288	583	5.98
	2	36.8	54.0	9.2	7.87	20.27	400+	132	22,656	498	9.53
	15	40.2	37.0	22.8	7.61	1.97	280	162	12,288	347	6.07
	21	22.0	42.6	35.4	7.65	44.00	352	324	20,016	394	7.83
	54	29.8	44.4	26.8	7.44	1.99	144	203	15,792	316	7.96
Gerow Clay Loam	27	42.0	31.2	26.8	7.47	.....	284	288	14,352	643	6.12
	40	40.6	33.0	26.4	7.55	2.68	400	185	14,064	442	5.59
	44	18.6	63.8	17.6	7.40	2.97	304	157	14,064	617	6.77
Hillier Clay Loam	6	25.2	36.4	38.4	7.66	2.76	340	332	13,968	360	4.88
	10	24.2	38.8	37.0	7.51	5.40	316	211	10,320	347	3.81
	11	32.6	38.8	28.6	7.54	0.53	196	236	14,592	347	6.40
	12	29.2	35.8	35.0	7.68	10.74	272	297	13,584	396	5.12
	13	32.0	32.8	35.2	7.75	2.69	204	244	14,112	420	3.43
Percy Fine Sandy Loam	41	45.0	36.2	18.8	6.88	.....	196	176	10,128	544	6.20
	42	48.4	32.6	19.0	5.98	.....	114	106	3,840	418	3.52
	43	25.6	55.2	19.2	6.00	.....	178	103	3,600	520	3.76
	47	53.0	31.6	15.4	6.60	.....	136	95	5,232	418	3.69
	50	54.8	40.2	5.0	6.08	.....	122	67	1,296	243	1.69
Pontypool Sand	35	89.1	7.9	3.0	6.69	.....	94	48	1,200	365	1.12
	36	85.5	11.6	2.9	5.49	.....	52	39	720	267	1.90
Pontypool Sandy Loam	49	72.8	20.2	7.0	7.15	0.33	36	67	3648	442	2.64
	50	76.2	18.6	5.2	5.91	.....	30	67	1,680	316	2.14
	51	70.8	24.4	4.8	6.72	.....	178	164	3,504	467	3.29
South Bay Clay Loam	20	22.0	35.2	42.8	6.60	.....	356	439	10,896	1,074	4.93
	56	22.2	37.6	40.2	6.66	.....	154	370	10,224	948	5.72
	57	15.8	42.0	42.2	6.99	.....	284	294	10,944	544	3.74
	58	19.2	51.4	29.4	7.17	.....	170	257	9,360	593	5.20
South Bay Clay Loam	14	28.8	35.8	35.4	6.81	.....	304	174	8,448	639	4.40
	22	15.6	58.0	26.4	6.03	.....	164	127	3,144	490	2.24
	23	22.2	52.2	25.6	5.98	.....	176	170	4,128	515	3.40
	38	31.0	40.6	28.4	7.02	.....	336	157	7,872	685	3.67
	48	29.2	43.4	27.4	7.40	.....	328	197	9,840	442	4.15
	53	35.0	35.0	30.0	7.50	1.68	128	212	13,680	520	4.81

Type	Sample No.	Sand	Silt	Clay	Reaction pH Glass Electrode	%CaCO3 (1)	Phosphorus Readily Soluble (2) lb. P/acre	Potassium Replaceable (3) lb. K/acre	Calcium Replaceable (4) lb. Ca/ac	Magnesium Replaceable (5) lb. Mg/ac.	Organic Matter (6) %C x1.724
		Bouyoucos Hydrometer									
		per cent 1.-.05mm	per cent .05-.002mm	per cent .002mm							
Wampoon Clay	17	36.2	32.2	31.6	6.41	.....	172	244	6,432	490	3.14
	18	24.2	30.6	45.2	6.33	.....	114	306	8,448	102	4.86
	24	22.4	45.8	31.8	6.17	.....	202	195	5,184	467	3.36
	60	29.0	40.2	30.8	6.68	.....	284	303	8,544	418	4.76

(a) Samples were taken during the course of the Prince Edward County Soil Survey, 1943. Old pastures representative of the type were selected whenever possible. The analyses were done by Messrs. A. L. Willis and H. S. Ive.

(1) For the method on the determination of calcium carbonate see "Ericson A. E., Li L.C. and Gieseking, J. E., "A Convenient Method for Estimating Carbonates in Soils and Related Materials"—Soil Science 63:6 1947.

(2) Lohse and Ruhnke's method of determining readily soluble phosphorus was employed. For discussion of this method see Lohse, H. W., Ruhnke, G. N., "Studies of Readily Soluble Phosphorus in Soils"—Soil Science 35:6 1933.

(3) Replaceable potassium—Volk and Truog's method of determining replaceable potassium was employed. For discussion of this method see: Volk, N. J., and Truog, E., "A Rapid Method of Determining the Readily Available Potash of Soils"—Jour. Amer. Soc. of Agron. 26 537-46, 1934.

(4) The replaceable calcium was determined on the same extract that was used in the determination of potassium.

(5) Magnesium is determined from the filtrate remaining from the calcium determination.

(6) The organic matter data was obtained by applying the factor 1.724 to the per cent organic carbon. The method described by Allison, L. E., "Organic Soil Carbon by Reduction of Chromic Acid"—Soil Science, Oct., 1935, p. 311, was used to determine the per cent organic carbon.

TABLE 15

BASE EXCHANGE CAPACITY AND PER CENT SATURATION OF SURFACE SAMPLES FROM PRINCE EDWARD COUNTY, ONTARIO

Soil Type	Sample No.	Reaction pH Glass Electrode	Base (1) Exchange Capacity M.e./100gms.	Per Cent Saturation				Ratios	
				(2) H+	Ca++	Mg++	K+	Ca:K	Ca:Mg
Ameliasburg Clay Loam	4	7.58	27.51	.....	133.6	9.5	1.56	104:1	23:1
	7	7.49	20.75	.....	151.8	6.0	1.68	91:1	32:1
	32	6.06	23.60	.....	85.4	14.7	1.57	55:1	9:1
	55	7.53	26.38	.....	146.8	5.5	1.59	69:1	46:1
Ameliasburg Clay Loam Imperfectly Drained	25	6.83	23.25	8.1	82.1	8.9	0.91	91:1	15:1
	28	7.14	21.40	.....	94.1	18.7	1.36	69:1	8:1
	29	6.84	30.60	.....	95.2	9.0	1.08	88:1	17:1
Ameliasburg Loam	8	7.50	12.25	.....	166.5	9.2	1.26	120:1	30:1
	9	7.47	21.15	.....	136.2	8.6	1.18	115:1	26:1
	16	7.33	19.00	.....	103.0	6.4	0.78	130:1	26:1
Brighton Sand	37	5.63	3.89	18.9	46.3	33.5	1.29	36:1	2:1
	39	5.90	3.49	.....	57.9	40.1	2.86	16:1	2:1
	45	5.29	3.79	36.0	31.6	29.0	3.44	12:1	2:1
Brighton Sandy Loam	46	5.80	8.08	32.1	48.3	18.6	1.00	50:1	4:1
Darlington Loam	26	6.18	17.10	2.6	80.8	15.4	1.17	84:1	9:1
	31	6.47	.....	.....	.....	.....	.....	.....	.....
	61	6.68	25.08	22.1	70.4	6.5	1.04	68:1	19:1
Elmbrook Clay	3	7.25	48.35	.....	100.0	12.4	0.83	121:1	13:1
	19	6.32	52.10	4.9	83.1	10.8	1.17	71:1	13:1
	33	7.21	35.40	.....	89.1	19.5	1.38	65:1	8:1
	34	6.00	24.55	2.8	63.8	31.4	2.04	31:1	3:1
	52	6.37	22.60	3.6	70.1	24.6	1.68	42:1	5:1
	5	5.91	19.10	10.3	66.7	22.0	1.04	64:1	4:1
	30	7.47	32.40	.....	128.2	11.7	0.90	143:1	18:1
Farmington Loam	1	7.73	23.00	.....	198.8	11.1	0.91	214:1	31:1
	2	7.87	32.50	.....	174.3	6.3	0.52	335:1	46:1
	15	7.61	22.60	.....	164.5	6.3	0.93	146:1	35:1
	21	7.65	32.40	.....	154.5	5.1	1.23	123:1	51:1
	54	7.44	34.34	.....	115.0	3.8	0.76	113:1	50:1

Soil Type	Sample No.	Reaction pH Glass Electrode	Base (1) Exchange Capacity M.e./100 gms.	Per Cent Saturation				Ratios	
				(2) H+	Ca++	Mg++	K+	Ca:K	Ca:Mg
Gerow Clay Loam	27	7.47	28.10	.....	127.7	9.4	1.32	97:1	22:1
	40	7.55	23.95	.....	146.5	7.6	1.00	150:1	32:1
	44	7.40	27.18	.....	129.2	9.4	0.74	126:1	23:1
Hillier Clay Loam	6	7.66	22.35	.....	156.5	6.6	1.83	83:1	38:1
	10	7.51	21.30	.....	121.2	6.7	1.26	96:1	30:1
	11	7.54	26.30	.....	138.8	5.4	1.14	122:1	43:1
	12	7.68	21.50	.....	158.0	7.7	1.76	92:1	35:1
	13	7.75	22.30	.....	166.0	7.8	1.39	82:1	34:1
Percy Fine Sandy Loam	41	6.88	25.19	.....	107.8	8.9	0.88	112:1	19:1
	42	5.98	12.10	5.1	79.6	14.2	1.08	90:1	9:1
	43	6.00	15.33	26.6	58.6	14.0	0.85	69:1	7:1
	47	6.60	17.28	13.5	75.7	10.1	0.69	109:1	13:1
	59	6.08	5.95	26.8	54.6	16.9	1.69	36:1	5:1
Pontypool Sand	35	6.69	3.80	.....	79.0	39.4	1.74	49:1	3:1
	36	5.49	4.40	32.9	41.0	25.0	1.14	36:1	3:1
Pontypool Sandy Loam	49	7.15	9.07	.....	100.0	20.0	0.99	106:1	8:1
	50	5.91	6.38	12.4	65.8	20.4	1.41	49:1	5:1
	51	6.72	9.86	.....	88.8	19.5	2.13	42:1	8:1
South Bay Clay	20	6.60	29.65	.....	92.0	14.9	1.95	49:1	10:1
	56	6.66	30.96	3.4	82.5	12.6	1.52	55:1	10:1
	57	6.99	24.79	.....	110.2	9.0	1.53	74:1	22:1
	58	7.17	23.30	.....	100.5	10.5	1.42	71:1	16:1
South Bay Clay Loam	14	6.81	21.15	.....	99.7	12.4	1.04	96:1	13:1
	22	6.03	13.90	27.8	56.5	14.5	1.15	50:1	7:1
	23	5.98	15.70	19.8	65.7	13.1	1.40	50:1	6:1
	38	7.02	21.61	.....	91.0	13.5	0.93	98:1	12:1
	48	7.40	23.64	.....	103.9	7.7	1.06	106:1	22:1
	53	7.50	23.80	.....	143.8	9.0	1.18	126:1	27:1
Waupoos Clay	17	6.41	20.40	9.7	78.9	9.9	1.52	53:1	13:1
	18	6.33	28.60	23.3	73.8	1.5	1.39	56:1	83:1
	24	6.17	18.60	18.7	69.7	10.3	1.34	53:1	11:1
	60	6.68	24.88	5.9	85.7	6.9	1.53	55:1	20:1

(1) Method proposed by Schollenberger C. J., and Simon R. H., Soil Science 59:1, 1945, "Determination of Exchange Capacity and Exchangeable Bases in Soil, Ammonium Acetate Method." The alternate method was used on the Prince Edward County soils in which the soil is leached with 1N KCl.

(2) By difference.

RP-1-90-1M
Queens Printer for Ontario 1990
ISBN 0-7729-6661-3